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MONTHLY WEATHER REVIEW

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SUMMARY OF THE INTENSITY AND SPECTRAL DISTRIBUTION OF SOLAR RADIATION AT NEW ORLEANS 1931–40, INCLUSIVE

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[Laboratory of Physiology, School of Medicine, Tulane University of Louisiana, New Orleans, October 1941]

In a previous paper, (1), data have been given on the intensity and spectral distribution of solar radiation at New Orleans from the beginning of 1928 through the first half of 1932, including measurements of total radiation (direct and diffuse, sun and sky) on a horizontal plane for 7 months in 1931 and for 8 months in 1932. A subsequent report (2) extended these data to cover 1933.

The present paper summarizes the data for the 10-year period 1931 through 1940. The work was aided by grants from the David Trautman Schwartz Research Fund of Tulane University.

The methods and procedures by which the values were obtained have remained essentially the same throughout this period except that in September 1939 the Richard recording millivoltmeter used in conjunction with the Eppley pyrheliometer for the continuous measurement of total radiation on a horizontal plane was replaced by a Leeds and Northrup recording potentiometer. For the most part, measurements of solar radiation at normal incidence and its spectral distribution—ultra-violet, luminous and infra-red—were made at 10 a. m., 12 m. and 2 p. m. on days when the sun was unobscured by clouds or haze. Measurements were also made at the same times of the spectral distribution of the total radiation, direct and diffuse, and of the diffuse sky radiation only, as received on a horizontal surface. Spectrograms to show the short-wave-length limit of the spectrum were also taken at these times. The determinations for 1931 were made from a tower about 40 feet above sea level, built on the roof of a small building adjacent to the laboratory; since January 1932, the measurements have been made from a better location on the roof of the laboratory building about 100 feet above sea level. This building is situated on the college campus about 4 miles from the business center, at latitude 29°56′ N., longitude 90°7′19″, and in an atmosphere reasonably clear of smoke and dust.

SOLAR RADIATION INTENSITIES AT NORMAL INCIDENCE

The averages intensities for the 10-year period are given in table 1. The values were calculated from at least 1 monthly determination for each of the 10 years, except for July and August when no measurements were made in 1934, 1935, 1936, 1938, and 1939. It is evident from these data that at 10 a. m. and 2 p. m. the solar radiation intensity at normal incidence throughout the year is close to or slightly exceeds a gram-calorie per square centimeter per minute, while at noon the value is usually definitely above this level. This highest value recorded during the 10-year period was 1.501 gr. cal. per sq. cm. per minute at noon on March 7, 1931.

TOTAL RADIATION ON A HORIZONTAL PLANE [1]

The values given in table 1 represent more or less momentary measurements of the amount of energy present in direct solar radiation on relatively clear days, which in New Orleans are only about a third of the days in the year. In table 2 are given the hourly averages of total radiation (direct and diffuse) for the different months of the year as calculated from the continuous records obtained with the Eppley pyrheliometer. No records were obtained in January, February, October, November, and December of 1931, and September and October of 1939. Records for occasional days or parts of days are incomplete because of difficulties with the recording apparatus. Otherwise the averages represent values calculated from the continuous daily records for the entire period. The average daily totals are given in the last column and are plotted as the mean curve in figure 1. This graph also shows the variation in the average daily total radiation for the different years of the 10-year period. Analysis of these values shows that in general they reflect the gradual change in solar altitude during the year as modified by variations in the clearness of the sky. This is particularly manifest in the maximum value for June 1936 during which month the percentage of sunshine (86 percent) was the highest obtained throughout the entire period of 10 years; the average cloudiness (in tenths of clouded sky) 3.5 was the lowest value obtained for the period with the exception of October 1940 when it was 3.1.

The close correlation between the percentage of sunshine (average percent of possible sunshine hours as obtained from Weather Bureau records), average cloudiness, and total radiation are shown in figure 2. The curve designated "clear days" represents values on days when clouds covered 0.3 or less of the sky. Of particular interest is the drop in the amount of sunshine and in total radiation during July and August which, as shown in figure 1, is often quite marked. This finding was discussed in a previous paper (2) and was shown to be characteristic of localities situated at about latitude 30° N. as compared with more northern cities. It is chiefly due to the extreme distortion of the distribution of rainfall, in the form of thundershowers caused by convectional overturning, which is characteristic of these months, these showers usually occurring during the middle of the day and being preceded and followed by a period of several hours of cumulus cloud formation.

[1] These values were calculated on the basis of a constant calibration factor for the Eppley pyrheliometer; Woertz and Hand (3) have recently reported that this procedure involves some error. Hand (4) included part of these data (1936-39 inclusive) in his summary of the total solar and sky radiation measurements made in the United States.

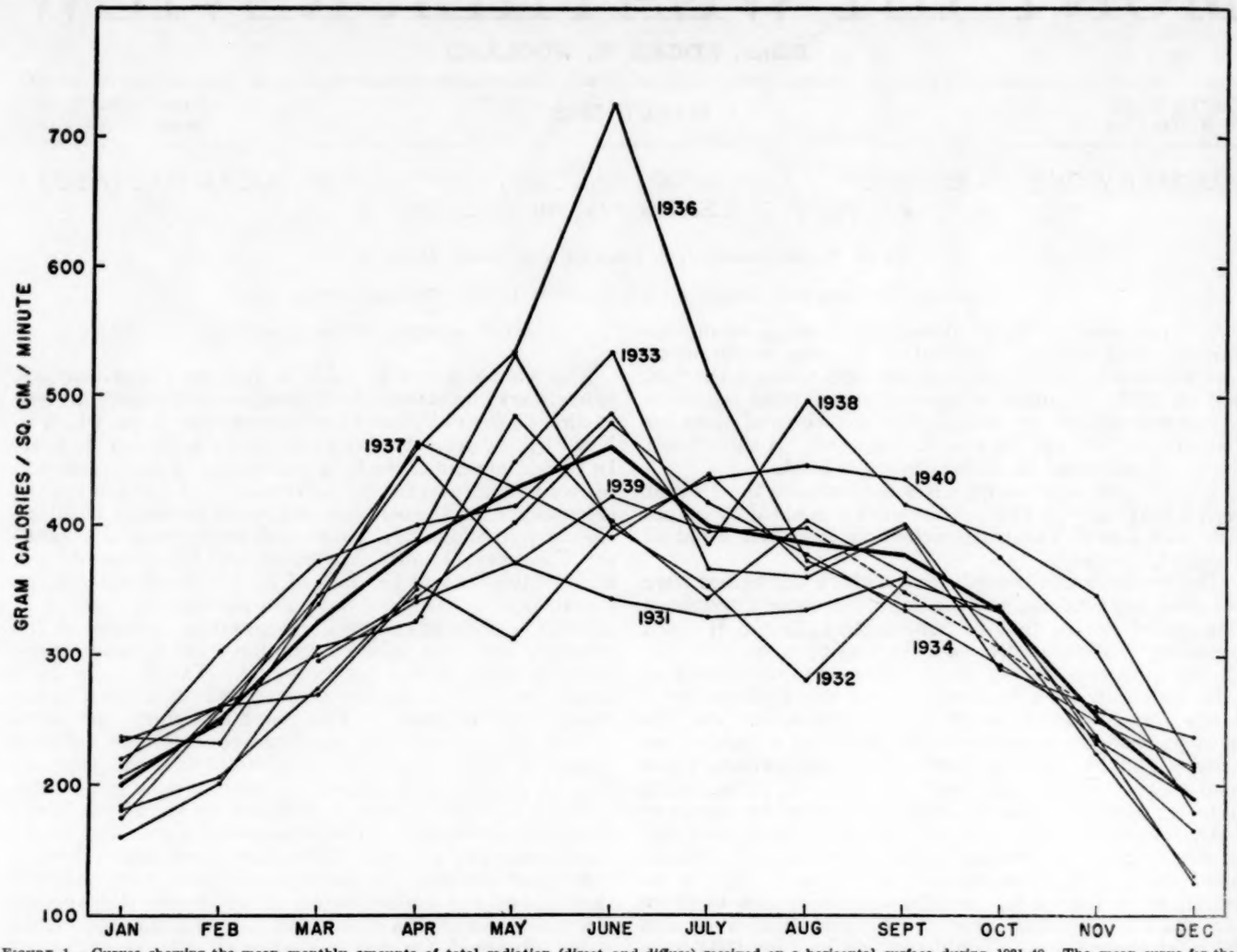

FIGURE 1.—Curves showing the mean monthly amounts of total radiation (direct and diffuse) received on a horizontal surface during 1931–40. The mean curve for the period is shown by the heavy line.

Table 3 shows the highest hourly averages as well as the highest daily totals found during each year of the 10-year period. Analysis of the daily records shows that particularly during May and July the radiation intensity frequently exceeds 1.5 gr.-cal. per sq. cm. per minute for short intervals, and at least once during each year there are momentary readings which exceed 2 gr.-cal. per sq. cm. per minute, the highest value which can be registered accurately on the recorder used.

SPECTRAL DISTRIBUTION OF ENERGY

The average percentage distribution of ultra-violet, luminous and infra-red energy in direct sunlight at normal incidence is given in table 4. The absolute values vary, of course, with the total radiation, but the percentage of each part relative to the total is quite consistent. With approximately similar total energy content the red and short infra-red energy (620 mμ to 1.4μ) tends to be higher during winter and early spring than in summer and fall; the decrease parallels the increase in water vapor pressure, which is about two and a half times as high in July as it is in January. The longer infra-red ($>1.4\mu$) and the luminous (400–620 mμ) components are relatively constant, showing only slight changes throughout the year.

The similarity of the average values for the ultra-violet are of interest in view of the known variability of this component with atmospheric conditions as well as with the altitude of the sun. Except for the months of January and February, this component comprises from 2.5 to 3 percent of the total energy during the hours from 10 a. m. to 2 p. m. and even during these 2 months occasional high values are obtained. In fact the highest value recorded during the 10-year period was on January 18, 1933, when the ultra-violet component ($<$400 mμ) was 0.1049 gr.-cal. per sq. cm. per minute or 9 percent of the total energy.

Table 5 is similar to table 4 except that it represents the spectral distribution of the total radiation, direct and diffuse, as received on a horizontal surface. The highest percentage values for the ultra-violet tend to occur during winter and early spring but the highest absolute amounts are usually found in late spring, summer, and early fall. The maximum percentage, 22.5, was obtained at noon on March 6, 1939, March 22, 1932, and April 22, 1932. The highest absolute amount was 0.221 gr.-cal. per sq. cm. per minute on the second of these days.

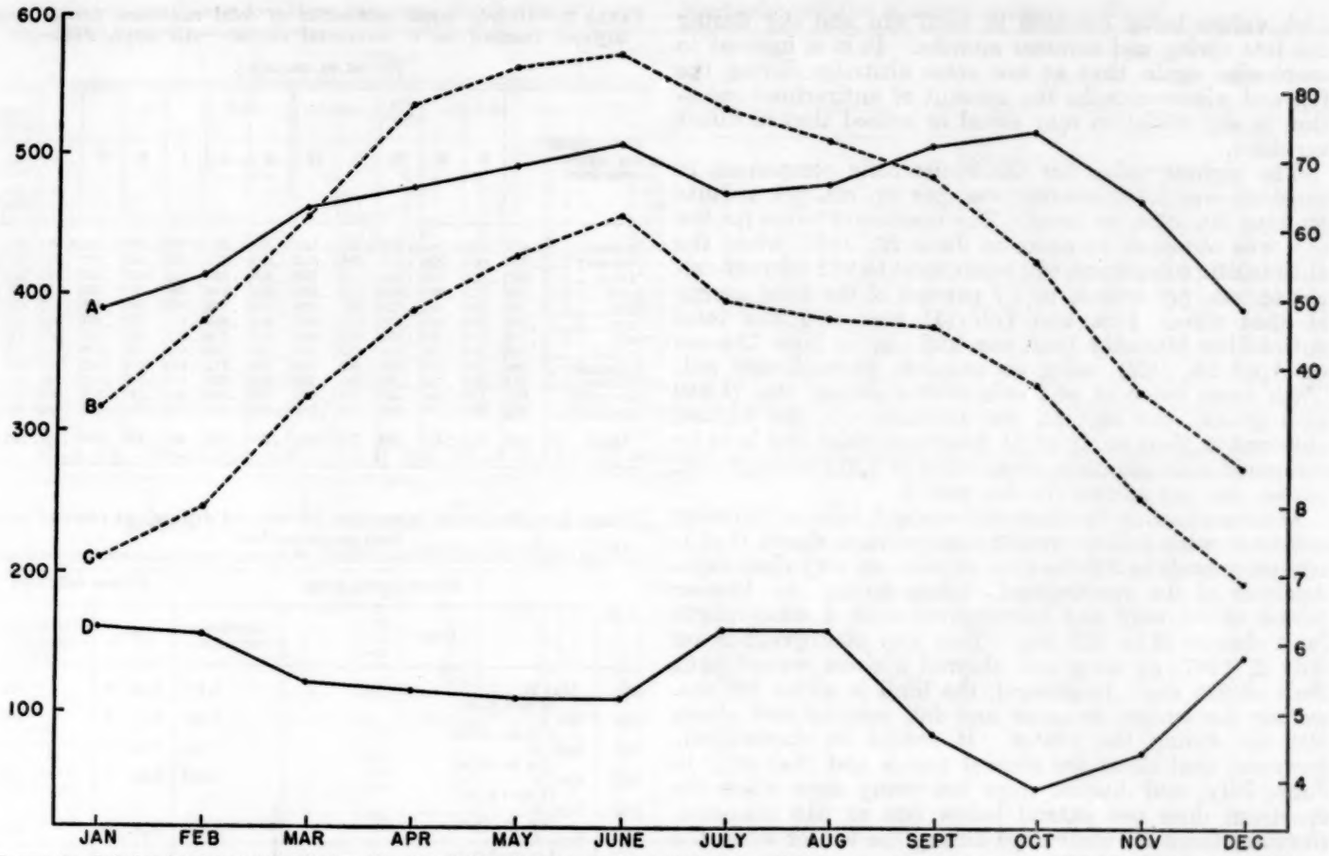

FIGURE 2.—Relation between total radiation (direct and diffuse) and percentages of sunshine and cloudiness. All values are means for the 10-year period 1931–40. A. Percent of possible sunshine. B. Total daily radiation, on clear days only, gr.-cal. per sq. cm. C. Total daily radiation on all days, gr.-cal. per sq. cm. D. Cloudines in tenths of total sky.

TOTAL ENERGY AND SPECTRAL DISTRIBUTION OF SKY RADIATION

The average total energy and spectral distribution of the diffuse radiation from the hemispherical dome of the sky, determined by shielding the Eppley pyrheliometer from the direct sun, are shown in table 6. Throughout the year between the hours of 10 a. m. and 2 p. m. the sky contributes approximately 10 percent of the total (sun and sky) radiation. The presence of clouds in the vicinity of the sun, but not obscuring it, considerably increases the total contributed by the sky. Thus the highest value during the 10-year period, 0.2496 gr.-cal. per sq. cm. per minute, was recorded on April 22, 1932, at 10 a. m. when the sun was surrounded, but not obscured, by cumulus clouds. This represented 26 percent of the total radiation at this time.

The total energy, in general, rises with increase in solar altitude; the increase is distributed chiefly in the ultra-violet and luminous regions, each of which tends to show higher percentage values in winter than in summer. The high ultra-violet content of sky radiation is due to the fact that it is the diffuse solar radiation scattered by the atmosphere. Since, in a perfectly dry, dust-free atmosphere, the scattering is inversely proportional to the fourth power of the wave length, the ultra-violet is relatively much more increased than the other components. A comparison of the mean annual intensities (table 7) shows that between the hours of 10 a. m. and 2 p. m. approximately 40 percent of the total ultra-violet radiation found in sunshine and sky radiation is furnished by the sky. There is considerable variation in the amount of ultra-violet in sky radiation relative to that in sunshine, the latter intensity usually being much greater. It is of interest, however, that during August the ultra-violet intensity in radiation from the sky equals or exceeds that of sunshine even at noon. This is probably due, in large measure, to the extreme cloudiness which usually occurs at this time of the year.

ANTIRACHITIC RADIATION

Considerable interest has centered about the short ultra-violet region (wave lengths shorter than 313 mμ) of the spectrum because of its effectiveness in preventing and curing rickets. Its variability has been emphasized as reflecting, more than any other part of the spectrum, the local atmospheric conditions at the time of measurement. The 10-year averages for the different months are given in table 8. They indicate that except for November and the winter months there is usually the equivalent of about 500 microgr.-cal. per sq. cm. per minute in solar radiation as measured at normal incidence between the hours of 10 a. m. and 2 p. m. Even in the winter months, however, values were obtained, particularly at noon, which equaled or exceeded those found at other times of the year. The highest value was obtained on May 6, 1940, at noon, when the antirachitic radiation amounted to 1,890 microgr. cal. per sq. cm. per minute (0.00189 gr.-cal.) or 4.1 percent of the total ultra-violet component and 0.14 percent of the total radiation.

In table 9 the monthly averages for the total (sun and sky) antirachitic energy as measured on a horizontal surface are compared with similar averages for sky antirachitic radiation only. There is a general tendency for the amounts in sunshine to increase with solar altitude,

high values being common in both sun and sky during the late spring and summer months. It is of interest to emphasize again that at low solar altitudes during the fall and winter months the amount of antirachitic radiation in sky radiation may equal or exceed that in direct sunshine.

The highest value for the antirachitic component in sunshine was 3,860 microgr.-cal. per sq. cm. per minute on May 30, 1934, at noon. The maximum value for the sky was obtained at noon on June 26, 1940, when the antirachitic component was equivalent to 972 microgr-cal. per sq. cm. per minute or 1.7 percent of the total energy at that time. Ives and Gill (5) measured the total antirachitic intensity from sun and sky in New Orleans on April 26, 1932, using an uranium photoelectric cell. Their noon value of 94.2 microwatts per sq. cm. (1,340 microgr.-cal. per sq. cm. per minute) was the highest obtained in their study of 14 American cities and is to be compared with our mean noon value of 1,272 microgr.-cal. per sq. cm. per minute for this month.

Measurement of the short wave-length limit of the solar spectrum with a Zeiss quartz spectrograph shows that it seldom extends to 300 mμ even at noon on very clear days. Analysis of the spectrograms taken during the 10-year period shows only one spectrogram with a wave-length limit shorter than 300 mμ. This was photographed on July 2, 1937, at noon and showed a short wave-length limit of 298 mμ. In general, the limit is about 304 mμ. during the spring, summer and fall months and above 306 mμ during the winter. It should be emphasized, however, that these are general trends and that even in June, July, and August there are many days when the spectrum does not extend below 308 or 310 mμ. and, likewise, there are clear days during the winter when the spectrum extends to 302 mμ.

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TABLE 1.—*Monthly mean intensities of direct solar radiation at normal incidence—1931–40*

[Gr. cal./sq. cm./min.]

	10 a. m.	12 m.	2 p. m.	Absolute maximum	Date
January	1.157	1.187	0.997	1.360	Jan. 14, 1931
February	1.046	1.159	0.985	1.380	Feb. 2, 1933
March	1.200	1.310	1.212	1.501	Mar. 7, 1931
April	1.107	1.178	1.042	1.210	Apr. 22, 1931
May	1.169	1.196	1.027	1.496	May 1, 1940
June	1.158	1.166	1.180	1.221	June 14, 1933
July	1.084	1.146	1.052	1.217	July 2, 1931
August	1.101	1.168	1.109	1.247	Aug. 12, 1940
September	1.079	1.076	1.114	1.198	Sept. 28, 1931
October	1.085	1.148	1.088	1.230	Oct. 12, 1936
November	1.057	1.099	0.994	1.178	Nov. 26, 1940
December	1.046	1.121	1.023	1.240	Dec. 20, 1939
Mean	1.107	1.163	1.069		

TABLE 2.—*Hourly mean intensities of total radiation (direct and diffuse) received on a horizontal surface—All days, 1931–40*

[Gr. cal./sq. cm./min.].

Hour ending (apparent time)	7	8	9	10	11	12	1	2	3	4	5	6	Mean daily total (gr. cal./sq. cm.)
January	0.003	0.045	0.164	0.323	0.460	0.542	0.555	0.501	0.394	0.248	0.102	0.012	201.0
February	.005	.068	.220	.403	.530	.614	.628	.611	.509	.343	.171	.041	247.8
March	.027	.153	.346	.551	.704	.796	.804	.749	.623	.448	.236	.075	325.1
April	.066	.251	.469	.656	.810	.884	.902	.844	.706	.532	.324	.137	388.3
May	.126	.325	.547	.731	.867	.929	.930	.848	.749	.580	.376	.167	430.5
June	.206	.408	.627	.775	.910	.967	.941	.882	.737	.570	.434	.195	459.1
July	.166	.374	.569	.705	.806	.849	.820	.738	.619	.472	.330	.202	398.7
August	.126	.334	.544	.701	.780	.792	.790	.736	.633	.488	.316	.158	385.1
September	.091	.287	.523	.698	.800	.866	.846	.771	.643	.454	.265	.102	379.8
October	.047	.210	.442	.639	.780	.856	.812	.730	.573	.370	.162	.036	337.7
November	.011	.125	.301	.489	.621	.690	.681	.596	.437	.242	.076	.008	256.5
December	.002	.052	.177	.336	.474	.533	.532	.469	.373	.200	.058	.002	190.5
Mean	.078	.225	.417	.589	.716	.780	.774	.720	.587	.420	.245	.091	333.3

TABLE 3.—*Maximum intensities (direct and diffuse) as received on a horizontal surface*

Year	Highest hourly mean			Highest daily total	
	Date	Gr.cal./sq. cm./min.		Date	Gr.cal./sq. cm./min.
1931	May 24, 12 m.–1 p. m.	1.312		Aug. 12	564.6
1932	Oct. 6, 11 a. m.–12 m.	1.227		Oct. 6	549.0
1933	June 10, 11 a. m.–12 m.	1.345		June 18	651.0
1934	Apr. 24, 12 m.–1 p. m.	1.418		July 4	654.1
1935	Sept. 2, 11 a. m.–12 m.; Sept. 4, 1 p. m.–2 p. m.	1.386		Apr. 13	627.0
1936	June 16, 11 a. m.–12 m.	1.624		June 16	857.8
1937	May 5, May 8, May 14, 12 m.–1 p. m.	1.470		May 3	678.1
1938	August 18, 11 a. m.–12 m.	1.620		May 11	645.4
1939	Apr. 20, 12 m.–1 p. m.	1.561		May 3	680.6
1940	May 13, 11 a. m.–12 m.	1.508		May 2	673.1

TABLE 4.—*Mean percentage distribution of energy. Direct solar radiation at normal incidence—1931–40*

Month	10 a. m.					12 m.					2 p. m.				
	Total	<400mμ	400–620mμ	620–1.4μ	>1.4μ	Total	<400mμ	400–620mμ	620–1.4μ	>1.4μ	Total	<400mμ	400–620mμ	620–1.4μ	>1.4μ
	Gr. cal./sq. cm./min.	%	%	%	%	*Gr. cal./sq. cm./min.*	%	%	%	%	*Gr. cal./sq. cm./min.*	%	%	%	%
January	1.157	2.2	34.1	40.2	23.5	1.187	2.0	34.4	39.3	24.3	0.997	2.4	33.2	42.4	22.0
February	1.046	1.7	34.9	37.6	25.8	1.159	2.1	33.0	35.5	29.4	0.985	1.7	30.9	35.7	31.7
March	1.201	2.8	35.3	33.3	28.6	1.310	2.5	35.6	34.0	27.9	1.212	3.0	35.1	33.6	28.3
April	1.107	2.9	34.9	34.2	28.0	1.178	3.0	36.6	33.2	27.2	1.042	2.6	35.3	37.0	25.1
May	1.169	2.7	35.7	34.0	27.6	1.196	2.9	35.2	32.9	29.0	1.027	2.5	34.6	31.7	31.2
June	1.158	3.0	34.0	33.9	29.1	1.166	2.9	36.5	33.8	26.8	1.180	3.2	35.2	31.4	30.2
July	1.084	2.3	35.7	34.5	27.5	1.146	2.9	35.6	31.3	30.2	1.052	2.8	36.7	31.1	29.4
August	1.101	3.2	36.3	31.2	29.3	1.168	3.1	37.6	30.0	29.3	1.109	3.0	40.6	28.6	27.8
September	1.079	2.9	36.6	32.9	27.6	1.076	3.2	36.3	32.1	28.4	1.114	3.0	36.4	32.3	28.3
October	1.085	3.3	33.0	33.6	30.1	1.148	2.6	34.4	33.3	29.7	1.088	2.0	35.1	32.2	30.7
November	1.057	3.1	31.2	33.8	31.9	1.099	2.9	33.1	35.9	28.1	0.994	3.0	34.3	32.4	30.3
December	1.046	3.0	36.9	34.2	25.9	1.121	2.6	33.5	36.9	27.0	1.023	2.6	36.1	31.8	29.5
Mean	1.107	2.8	34.9	34.4	27.9	1.163	2.6	35.5	33.9	28.0	1.069	2.6	35.3	33.4	28.7

TABLE 5.—*Percentage distribution of total (direct and diffuse) radiation as received on a horizontal surface—Monthly means: 1931–40*

Month	10 a. m.				12 m.				2 p. m.			
	Total	<400 mμ	400–620 mμ	>620 mμ	Total	<400 mμ	400–620 mμ	>620 mμ	Total	<400 mμ	400–620 mμ	>620 mμ
	Gr. cal./sq. cm./min.	%	%	%	Gr. cal./sq. cm./min.	%	%	%	Gr. cal./sq. cm./min.	%	%	%
January	0.768	10.9	17.1	70.9	0.958	9.3	13.6	77.1	0.744	12.5	15.2	72.3
February	0.781	9.6	16.0	74.4	1.036	9.4	14.9	75.7	0.947	10.0	14.2	75.8
March	0.953	12.7	15.9	72.7	1.180	9.3	13.6	77.1	1.114	8.3	14.8	76.9
April	1.104	13.0	18.2	68.8	1.268	9.9	17.1	73.0	1.120	11.1	16.7	72.2
May	1.180	10.0	13.3	76.7	1.396	7.8	12.9	79.3	1.135	10.6	18.3	71.1
June	1.304	7.9	11.9	80.2	1.397	8.1	13.5	78.4	1.190	7.0	13.2	79.8
July*												
August	1.212	6.4	14.7	78.9	1.304	8.1	16.2	75.7	1.202	7.9	12.7	79.4
September	1.134	7.4	13.8	78.8	1.165	8.1	13.8	78.1	1.059	7.9	13.0	79.1
October	1.068	8.6	14.7	75.7	1.134	8.6	13.7	77.7	1.115	8.6	13.3	78.1
November	.864	8.3	12.7	78.5	.928	9.3	13.1	77.6	.719	10.5	13.7	75.8
December	.637	8.1	12.2	79.7	.871	9.1	13.5	77.4	.618	10.4	13.4	76.2
Mean	1.000	9.1	14.6	76.3	1.149	8.8	14.2	77.0	0.998	9.6	14.3	76.1

*Too few values to average.

TABLE 6.—*Monthly mean totals and percentage distribution of sky radiation as measured on a horizontal surface—1931–40*

Month	10 a. m.				12 m.				2 p. m.			
	Total	<400mμ	400–620mμ	>620mμ	Total	<400mμ	400–620mμ	>620mμ	Total	<400mμ	400–620mμ	>620mμ
	Gr. cal./sq. cm./min.	%	%	%	*Gr. cal./sq. cm./min.*	%	%	%	*Gr. cal./sq. cm./min.*	%	%	%
January	0.081	48.5	38.0	13.5	0.078	44.3	35.7	20.0	0.076	49.2	37.6	13.2
February	.072	46.8	39.5	13.7	.080	42.1	34.4	23.5	.080	42.0	32.7	25.4
March	.078	45.5	32.7	21.8	.101	41.0	31.9	27.1	.092	47.3	34.7	18.0
April	.102	41.8	32.9	25.3	.103	41.1	30.9	28.0	.104	45.6	33.2	20.9
May	.108	38.0	31.9	29.1	.101	36.2	29.9	34.9	.103	44.3	34.9	20.9
June	.068	41.4	31.4	27.2	.102	39.2	33.0	27.8	.079	44.0	34.7	21.3
July	.142	39.3	37.6	23.1	.164	38.0	34.1	27.9	.130	45.9	36.8	17.3
August	.111	36.8	31.4	31.8	.130	46.4	33.3	20.3	.104	44.7	31.7	23.6
September	.095	38.0	31.1	30.9	.101	37.4	32.1	30.5	.092	46.6	33.2	20.2
October	.083	42.8	34.6	22.6	.101	46.6	35.7	17.7	.082	47.1	37.1	16.0
November	.073	42.8	34.0	23.2	.088	47.6	35.8	16.6	.080	49.4	35.7	16.7
December	.046	44.1	31.3	24.5	.068	49.7	34.2	16.1	.054	49.8	38.8	11.4
Mean	.090	42.2	33.9	23.9	.101	42.5	33.3	24.2	.090	46.3	35.0	18.7

TABLE 7.—*Monthly means showing the annual variation in the ultra-violet (<400 mμ) intensities in the total (sun and sky) and sky radiation as received on a horizontal surface—1931–40*

[Gr. cal./sq. cm./min.]

Month	10 a.m.				12 m.				2 p.m.			
	Sun and sky	Sky	Sun	Sun / Sky sky =100	Sun and sky	Sky	Sun	Sun / Sky sky =100	Sun and sky	Sky	Sun	Sun / Sky sky =100
January	.0837	.0393	.0444	1.13	.0891	.0346	.0545	1.58	.0930	.0374	.0556	1.50
February	.0750	.0337	.0413	1.23	.0974	.0337	.0637	1.90	.0947	.0336	.0611	1.82
March	.1210	.0355	.0855	2.41	.1097	.0414	.0683	1.65	.0925	.0435	.0490	1.13
April	.1435	.0426	.1009	2.37	.1255	.0423	.0832	1.96	.1243	.0474	.0769	1.62
May	.1180	.0410	.0770	1.90	.1089	.0366	.0723	1.98	.1203	.0456	.0747	1.63
June	.1030	.0282	.0748	2.65	.1132	.0400	.0732	1.83	.0833	.0348	.0485	1.40
July *												
August	.0776	.0408	.0368	0.90	.1156	.0603	.0553	0.91	.0960	.0465	.0495	1.06
September	.0839	.0361	.0478	1.33	.0954	.0378	.0576	1.53	.0837	.0429	.0408	0.95
October	.0918	.0355	.0563	1.59	.0942	.0507	.0435	0.86	.0959	.0386	.0573	1.49
November	.0717	.0312	.0405	1.30	.0863	.0419	.0444	1.06	.0755	.0395	.0360	0.92
December	.0516	.0203	.0313	1.54	.0793	.0348	.0445	1.28	.0642	.0269	.0373	1.38
Mean	.0928	.0349	.0579	1.66	.1014	.0413	.0601	1.46	.0930	.0397	.0533	1.35

* Too few values to average.

TABLE 8.—*Annual variation in short ultra-violet (<313 mμ) intensities of solar radiation at normal incidence—Monthly means: 1931–40*

[Microgr. cal./sq. cm./min.]

	January	February	March	April	May	June	July	August	September	October	November	December	Mean
10 a. m.	322	473	587	559	355	649	503	485	477	534	286	80	443
12 m.	507	508	621	561	704	726	695	521	511	593	520	588	588
2 p. m.	146	299	469	556	481	391	591	498	559	364	225	67	389
Mean	325	427	559	528	513	589	596	501	515	497	344	245	470

TABLE 9.—*Monthly means showing the annual variation in short ultraviolet (<313μ) intensities in the total (sun and sky) and sky radiation received on a horizontal surface—1931–40*

[Microgr. cal./sq./min.]

Month	10 A. M.				12 M.				2 P. M.			
	Sun and Sky	Sky	Sun	Sun / Sky sky =100	Sun and Sky	Sky	Sun	Sun / Sky sky =100	Sun and Sky	Sky	Sun	Sun / Sky sky =100
January	596	190	406	2.1	1,149	489	660	1.4	642	324	316	0.97
February	825	270	555	1.9	1,078	236	842	3.6	869	262	607	2.3
March	1,266				1,317	282	1,035	3.7	977	350	627	1.8
April	1,114	175	939	5.4	1,272	263	1,009	3.8	1,370	331	1,039	3.1
May	2,628	271	2,357	8.7	2,330	225	2,105	9.4	1,499	252	1,247	4.9
June	1,588	203	1,385	6.8	1,904	515	1,389	2.7	1,502	312	1,190	3.8
July	1,750	241	1,509	6.3		636				611		
August	1,830	208	1,622	7.8	1,867	268	1,599	6.0		317		
September	1,243	250	993	4.0	1,690	475	1,215	2.6	1,204	376	828	2.2
October	631	379	252	0.7	1,051	213	838	3.9	887	291	596	2.0
November	563	303	260	0.9	913	159	764	4.8	785	391	394	1.0
December	330	109	221	2.0	1,089	133	959	7.2	426	135	291	2.2
Mean	1,197	283	914	3.2	1,424	325	1,099	3.4	1,016	329	687	2.1

NOTES AND REVIEWS

H. U. SVERDRUP. *Oceanography for Meteorologists.* New York (Prentice-Hall), 1942. 246 pp., illus.

The interactions between the atmosphere and the oceans exert important influences on many meteorological phenomena; during recent years they have been involved to an increasing extent in current meteorological research, and it has become more and more necessary for both the theoretical and the practical meteorologist to be familiar with many topics from physical oceanography. This book, written by an authority on both meteorology and oceanography, has been prepared expressly to meet the need for a source of information for the purposes of the meteorologist.

The introductory chapters are devoted to radiation and absorption by the atmosphere and the oceans, and the heat balance of the earth as a whole; the physical properties of sea water; and the nature and technique of oceanographic observations, including descriptions of the instruments that are used.

The next few chapters discuss the general principles of physical oceanography—the processes of the heating and cooling of the oceans; the distribution of salinity, temperature, and density over the surface of the oceans and in the subsurface waters; the physical theories of ocean currents, wind currents, and wind waves; and the thermodynamics of ocean currents.

The final chapters describe the water masses and currents of the various oceans of the world; and the existing oceanic influences on the weather and climate of different regions of the globe.

A rare halo phenomenon.—On April 22, 1942, from 10:30 to 11:15 E. S. T. the upper half of an ordinary halo of 22° was observed at State College, Pa. The colors were very brilliant. At 15:10 E. S. T. the small ring again appeared and at 15:15 the two parhelia and the upper tangent arc of the small ring were seen. At 15:30 a parhelic circle was added to the display, complete except for the interior of the small ring. The width of the parhelic circle was measured at 1.5°; the parhelia were at an angular distance of 26.3° from the center of the sun. The inner red rim of the common ring had a radius of 21.9°. The sun's altitude corresponding to these measurements was 37.7°. At 15:55 E. S. T. the parhelic circle had disappeared leaving only the small ring, its upper tangent arc and the two parhelia. At 17:00 only the parhelia were left, which faded away by 17:20.

As evidence of the rarity of the full parhelic circle, it may be mentioned that during the period from January 1934 to date, the writer has systematically observed halo phenomena and accumulated in this time records for 954 days with halo phenomena, corresponding to an average of 115 days a year. Among all these observations the display seen on April 22 is the first complete parhelic circle seen.

—*H. Neuberger, State College, Pa.*

METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR MARCH 1942

[Climate and Crop Weather Division, J. B. KINCER, in charge]

AEROLOGICAL OBSERVATIONS

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during March 1942*

Stations with elevations in meters above sea level

Altitude (meters) m. s. l.	Albuquerque, N. Mex. (1,620 m.)				Atlanta, Ga. (300 m.)				Bismarck, N. Dak. (505 m.)				Boise, Idaho (864 m.)				Brownsville, Tex. (6 m.)				Buffalo, N. Y. (221 miles)				Charleston, S. C. (14 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	835	6.8	31	31	980	9.5	74	31	952	−1.0	78	31	917	4.4	62	----	----	----	----	31	985	1.3	84	31	1,013	12.4	78
500	----	----	----	----	31	957	10.9	67	----	----	----	----	----	----	----	----	----	----	----	----	31	951	0.8	82	31	957	12.7	65
1,000	----	----	----	----	31	901	8.0	65	31	895	−1.5	75	31	902	5.4	57	----	----	----	----	31	894	−1.5	80	31	901	9.7	64
1,500	----	----	----	----	31	848	4.9	65	31	840	−3.4	74	31	848	3.1	52	----	----	----	----	31	839	−3.5	76	31	848	6.9	63
2,000	31	797	6.1	31	30	797	2.1	61	31	788	−5.5	72	31	797	−0.6	52	----	----	----	----	31	787	−5.3	71	31	798	4.8	59
2,500	31	749	2.3	32	30	749	0.5	50	31	740	−7.8	69	31	748	−4.4	52	----	----	----	----	31	738	−7.4	68	31	750	2.9	52
3,000	31	704	−1.5	33	30	704	−1.6	44	31	693	−10.7	67	31	702	−7.8	53	----	----	----	----	31	692	−9.4	65	31	705	0.3	50
4,000	31	620	−8.7	34	30	620	−6.3	39	30	608	−16.8	63	30	616	−13.9	53	----	----	----	----	30	607	−14.6	57	30	622	−5.1	46
5,000	31	544	−15.6	35	29	545	−12.5	39	30	532	−23.3	58	30	540	−20.5	53	----	----	----	----	30	532	−20.7	54	29	547	−11.5	45
6,000	30	476	−22.1	33	29	477	−19.2	39	29	463	−29.8	57	30	471	−27.1	52	----	----	----	----	30	464	−27.1	50	29	479	−18.2	44
7,000	29	414	−29.0	32	28	416	−26.0	37	28	401	−37.1	56	30	409	−34.4	51	----	----	----	----	28	403	−34.1	48	28	418	−25.4	45
8,000	29	360	−35.7	31	28	362	−33.4	38	28	347	−44.5	----	30	353	−41.8	----	----	----	----	----	27	348	−41.0	----	28	363	−32.3	44
9,000	28	310	−42.7	----	27	313	−40.5	----	28	298	−51.0	----	30	304	−49.1	----	----	----	----	----	26	300	−47.8	----	28	314	−39.4	42
10,000	28	267	−49.5	----	27	270	−47.1	----	28	255	−56.3	----	30	260	−55.5	----	----	----	----	----	25	258	−53.3	----	28	271	−46.4	----
11,000	25	229	−55.1	----	26	232	−52.9	----	28	218	−58.3	----	29	223	−59.4	----	----	----	----	----	25	221	−56.1	----	27	233	−52.9	----
12,000	22	196	−58.0	----	25	198	−56.6	----	28	186	−57.4	----	28	190	−60.3	----	----	----	----	----	25	188	−57.0	----	27	199	−57.0	----
13,000	21	167	−58.4	----	23	169	−58.1	----	27	158	−55.2	----	23	162	−59.1	----	----	----	----	----	25	161	−55.6	----	26	169	−59.0	----
14,000	18	142	−58.8	----	17	144	−59.6	----	27	136	−54.7	----	19	138	−57.5	----	----	----	----	----	25	137	−55.7	----	25	144	−60.6	----
15,000	14	121	−59.8	----	16	122	−61.8	----	25	116	−54.9	----	17	117	−57.3	----	----	----	----	----	25	118	−56.5	----	21	123	−63.1	----
16,000	12	103	−61.4	----	13	104	−63.5	----	21	99	−55.5	----	11	100	−57.5	----	----	----	----	----	19	100	−57.4	----	18	104	−65.7	----
17,000	10	88	−63.3	----	9	88	−64.9	----	16	85	−56.2	----	7	85	−58.0	----	----	----	----	----	11	86	−58.6	----	13	88	−66.8	----
18,000	5	74	−62.5	----	5	74	−65.6	----	5	73	−56.2	----	----	----	----	----	----	----	----	----	6	73	−57.6	----	7	75	−68.1	----

Stations with elevations in meters above sea level

Altitude (meters) m. s. l.	Denver, Colo. (1,616 m.)				Detroit, Mich. (194 m.)				El Paso, Tex. (1,193 m.)				Ely, Nev. (1,908 m.)				Great Falls, Mont. (1,128 m.)				Huntington, W. Va. (172 m.)				Joliet, Ill. (178 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	834	0.9	61	31	986	1.9	81	31	880	11.8	33	31	807	−1.3	74	30	884	1.1	62	30	993	5.8	74	30	990	3.0	82
500	----	----	----	----	31	950	1.3	77	----	----	----	----	----	----	----	----	----	----	----	----	30	954	6.6	70	30	951	3.2	81
1,000	----	----	----	----	31	893	−0.1	75	----	----	----	----	----	----	----	----	----	----	----	----	30	897	3.8	67	30	894	0.9	80
1,500	----	----	----	----	31	838	−2.0	75	31	848	12.3	31	----	----	----	----	30	844	0.8	60	30	843	0.7	68	30	840	−1.6	74
2,000	31	795	2.1	58	31	787	−4.2	72	31	798	9.0	30	31	798	0.0	68	30	793	−2.4	58	30	792	−2.6	67	30	788	−3.8	69
2,500	31	747	−1.2	54	31	738	−6.6	69	31	751	5.0	30	31	750	−1.3	60	30	744	−6.1	58	30	743	−5.3	65	29	740	−5.9	63
3,000	31	701	−5.1	53	31	692	−9.0	65	31	706	1.6	30	31	704	−5.0	59	30	698	−9.6	59	30	697	−7.9	63	29	694	−8.8	63
4,000	31	616	−12.9	54	30	607	−14.7	58	31	623	−5.0	30	31	619	−11.7	57	30	612	−16.1	55	30	612	−13.4	57	28	609	−14.4	62
5,000	31	540	−19.3	54	29	532	−21.0	57	31	548	−11.5	29	31	543	−17.5	53	30	535	−22.7	52	30	537	−19.1	53	26	533	−20.3	59
6,000	31	472	−26.1	53	29	463	−27.6	56	31	480	−17.9	28	30	474	−24.4	51	30	466	−29.4	51	29	468	−25.7	51	26	465	−26.6	56
7,000	30	410	−33.2	52	28	402	−34.5	56	30	419	−25.0	28	29	412	−31.8	50	30	404	−36.7	50	29	407	−32.4	47	25	404	−33.9	55
8,000	30	354	−40.8	----	24	347	−41.9	----	30	364	−32.2	28	28	357	−39.1	50	30	349	−44.0	----	29	353	−39.4	45	24	349	−41.2	----
9,000	29	305	−47.9	----	23	299	−48.3	----	30	315	−39.1	27	28	308	−46.5	----	30	300	−50.8	----	28	304	−45.9	----	24	301	−47.2	----
10,000	28	261	−53.5	----	21	257	−53.1	----	30	272	−46.0	----	28	264	−52.9	----	29	257	−56.5	----	27	261	−51.4	----	23	258	−51.5	----
11,000	28	224	−57.3	----	20	220	−55.9	----	30	233	−52.6	----	28	226	−58.0	----	29	220	−59.5	----	25	224	−55.0	----	22	221	−54.3	----
12,000	28	191	−58.5	----	16	188	−56.6	----	30	200	−57.1	----	27	193	−59.7	----	29	187	−59.2	----	25	191	−56.6	----	21	189	−55.3	----
13,000	26	163	−56.4	----	15	160	−55.6	----	30	170	−58.5	----	26	164	−58.9	----	27	159	−57.3	----	22	164	−56.5	----	21	162	−54.7	----
14,000	24	139	−56.2	----	13	137	−55.1	----	30	145	−59.4	----	25	140	−58.6	----	23	136	−55.7	----	19	140	−56.8	----	21	138	−54.6	----
15,000	14	118	−56.3	----	11	117	−55.4	----	28	123	−61.6	----	25	119	−58.9	----	21	116	−55.4	----	15	120	−57.9	----	19	118	−55.9	----
16,000	11	101	−58.2	----	7	100	−56.7	----	25	105	−64.3	----	23	101	−60.4	----	17	99	−56.6	----	13	102	−59.3	----	17	101	−57.1	----
17,000	9	86	−59.6	----	----	----	----	----	22	89	−66.6	----	18	86	−61.5	----	9	85	−57.4	----	9	87	−60.5	----	10	86	−57.6	----
18,000	5	73	−60.3	----	----	----	----	----	13	76	−67.6	----	6	73	−61.2	----	----	----	----	----	----	----	----	----	5	74	−57.8	----
19,000	----	----	----	----	----	----	----	----	7	64	−65.7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidities in percent obtained by airplanes and radiosondes during March 1942*—Continued

Altitude (meters) m.s.l.	Stations with elevations in meters above sea level																							
	Lake Charles, La. (6 m.)				Lakehurst, N. J.[1] (39 m.)				Medford, Oreg. (401 m.)				Miami, Fla. (4 m.)				Nashville, Tenn. (180 m.)				Norfolk, Va.[1 2] (10 m.)				Oakland, Calif. (2 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	1,014	13.4	85	25	1,010	5.0	68	31	970	8.7	61	31	1,016	19.0	84	31	992	9.7	67	21	1,014	7.6	74	31	1,017	12.5	71
500	31	956	13.6	67	25	955	4.7	56	31	959	9.1	58	31	959	17.8	82	31	955	9.8	64	21	955	7.1	63	31	958	10.6	63
1,000	31	901	11.1	59	25	898	1.9	58	31	902	6.6	57	31	904	15.4	79	31	899	7.2	60	21	899	4.4	57	31	902	8.4	55
1,500	31	848	9.5	50	25	843	−0.4	56	31	848	3.0	63	31	853	13.5	70	31	845	3.8	59	21	845	1.7	55	31	849	5.9	51
2,000	30	798	7.5	46	25	792	−2.3	54	31	797	−0.6	65	31	803	11.5	59	31	795	0.6	55	21	794	−0.5	53	31	788	3.4	45
2,500	30	751	5.5	42	25	743	−4.0	49	31	748	−3.6	61	31	757	9.3	53	31	746	−1.8	52	21	745	−2.9	49	31	750	1.2	40
3,000	30	706	3.0	40	25	697	−6.5	45	31	702	−6.4	56	31	712	6.7	48	31	701	−4.4	50	21	700	−4.8	45	31	705	−1.8	38
4,000	30	624	−2.8	36	25	613	−12.3	39	31	617	−12.3	49	30	630	1.6	39	30	617	−9.4	50	21	615	−10.6	44	31	621	−7.9	37
5,000	29	549	−9.8	34	25	536	−18.7	37	31	541	−18.3	47	29	556	−4.2	37	28	541	−15.0	50	21	539	−16.3	42	30	545	−14.2	36
6,000	29	481	−16.6	31	25	468	−25.6	32	29	472	−25.3	44	28	489	−10.2	34	28	474	−21.1	48	5	471	−23.0	36	29	477	−21.3	35
7,000	29	420	−23.3	30	25	407	−32.8	28	29	411	−32.4	43	27	429	−17.2	33	27	413	−27.9	46					28	415	−28.7	34
8,000	29	366	−30.1	29	25	353	−39.4	----	29	355	−39.9	42	27	375	−24.1	32	27	358	−34.9	46					28	360	−35.9	33
9,000	27	317	−37.4	29	25	304	−45.4	----	29	306	−47.1	----	26	326	−31.2	32	27	310	−41.5	----					27	311	−43.4	----
10,000	25	274	−44.5	----	25	262	−50.9	----	29	263	−53.8	----	26	283	−38.3	32	26	267	−47.7	----					27	268	−50.4	----
11,000	23	235	−50.7	----	25	224	−54.3	----	29	225	−58.7	----	26	244	−45.0	----	25	229	−52.9	----					27	229	−56.2	----
12,000	21	201	−56.8	----	25	191	−56.1	----	29	192	−61.1	----	25	209	−51.1	----	24	196	−55.7	----					26	196	−59.8	----
13,000	20	171	−60.2	----	23	164	−56.2	----	29	163	−59.8	----	23	179	−56.5	----	24	167	−55.8	----					24	167	−60.0	----
14,000	17	145	−61.8	----	22	140	−56.4	----	28	139	−58.3	----	23	153	−61.1	----	24	143	−56.5	----					21	142	−58.6	----
15,000	17	123	−64.4	----	20	120	−57.5	----	25	119	−58.1	----	23	129	−65.7	----	21	122	−57.8	----					19	121	−58.9	----
16,000	15	105	−67.3	----	20	103	−58.8	----	19	101	−58.6	----	23	110	−70.1	----	18	104	−59.2	----					16	103	−61.0	----
17,000	13	88	−69.7	----	14	87	−59.7	----	17	86	−59.5	----	21	93	−73.2	----	15	89	−61.0	----					12	88	−62.2	----
18,000	5	74	−70.2	----	5	74	−60.3	----	14	73	−59.9	----	19	78	−74.4	----	11	75	−61.6	----					6	75	−63.2	----
19,000													11	65	−72.7	----	6	64	−60.7	----								
20,000													6	54	−70.9	----												

Altitude (meters) m. s. l.	Stations with elevations in meters above sea level																							
	Oklahoma City, Okla. (391 m.)				Omaha, Nebr. (301 m.)				Pensacola, Fla.[1] (24 m.)				Phoenix, Ariz. (339 m.)				Portland, Maine, (20 m.)				St. Louis, Mo. (171 m.)				St. Paul, Minn. (225 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	966	8.8	56	31	976	2.9	79	16	1,015	14.6	77	31	973	13.8	39	31	1,008	0.6	80	31	992	6.4	71	31	983	1.6	77
500	31	954	10.4	53	31	952	3.4	73	16	959	12.9	64	31	955	18.0	35	31	950	−0.2	70	31	952	6.0	67	31	950	0.9	75
1,000	31	898	9.0	48	31	895	1.6	72	16	903	10.1	57	31	900	15.1	32	31	892	−2.8	67	31	896	3.8	64	31	893	−1.6	73
1,500	31	845	5.9	48	31	841	−1.0	71	16	851	8.7	46	31	848	11.1	32	31	837	−4.9	68	31	842	1.4	63	31	838	−4.3	72
2,000	31	795	3.0	47	31	790	−3.2	65	16	801	7.2	36	31	798	7.0	34	31	786	−6.3	64	31	791	−1.3	62	31	786	−6.2	69
2,500	31	747	0.3	43	31	741	−5.6	62	16	753	4.5	33	31	751	3.4	35	31	737	−8.4	60	31	743	−3.8	59	31	738	−8.2	66
3,000	31	702	−3.2	43	31	695	−8.3	59	16	708	1.8	32	31	706	0.2	34	31	690	−10.7	59	31	697	−6.4	58	31	691	−10.9	64
4,000	29	618	−9.6	42	30	610	−14.1	55	16	624	−4.0	34	30	622	−5.5	30	30	605	−15.6	58	31	612	−11.9	56	31	606	−16.5	60
5,000	29	542	−16.6	40	29	534	−20.6	52	12	549	−11.0	36	30	547	−11.7	29	29	529	−21.6	55	31	537	−18.3	54	30	530	−23.2	59
6,000	28	473	−23.3	39	28	466	−27.3	49	10	481	−17.6	38	28	479	−19.0	30	29	462	−28.4	53	31	469	−25.0	52	29	462	−29.5	59
7,000	27	412	−29.8	36	28	404	−34.9	48	10	420	−24.5	43	28	418	−26.2	30	29	400	−35.5	51	31	408	−31.9	51	28	400	−36.5	58
8,000	25	357	−37.0	36	28	350	−42.0	----	6	364	−31.3	----	27	364	−33.2	29	28	346	−42.2	----	31	353	−38.9	----	27	346	−44.0	----
9,000	25	308	−44.3	----	28	301	−48.8	----	5	316	−36.9	----	26	314	−40.4	----	28	298	−47.9	----	31	304	−45.5	----	25	297	−50.7	----
10,000	24	265	−50.4	----	28	258	−53.1	----					26	271	−47.3	----	27	256	−52.4	----	30	262	−50.9	----	24	254	−55.5	----
11,000	24	227	−54.8	----	28	221	−55.4	----					24	233	−53.2	----	26	219	−54.6	----	30	224	−55.1	----	24	218	−56.9	----
12,000	23	194	−56.9	----	26	189	−55.0	----					23	199	−58.1	----	26	187	−55.1	----	29	192	−55.8	----	22	186	−55.8	----
13,000	21	166	−57.7	----	25	162	−54.7	----					23	170	−59.8	----	24	160	−54.7	----	28	164	−55.6	----	20	158	−54.9	----
14,000	17	141	−57.6	----	24	138	−54.8	----					23	144	−60.1	----	16	137	−54.9	----	27	140	−55.4	----	17	136	−54.6	----
15,000	15	120	−58.8	----	19	118	−55.3	----					22	123	−61.9	----	15	117	−56.1	----	24	119	−56.5	----	16	116	−55.3	----
16,000	14	103	−60.6	----	17	101	−56.2	----					22	104	−63.6	----	10	100	−56.9	----	21	102	−58.0	----	13	99	−56.5	----
17,000	11	87	−62.1	----	10	86	−57.3	----					16	89	−64.3	----					13	87	−58.4	----	8	85	−56.9	----
18,000	8	74	−61.9	----									14	75	−64.6	----					10	74	−58.7	----				
19,000													7	64	−64.3	----												

See footnotes at end of table.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centrigade, and relative humidities in percent, obtained by airplanes and radiosondes during March 1942*—Continued

Altitude (meters) m. s. l.	Stations with elevations in meters above sea level																							
	San Antonio, Tex. (175 m.)				San Diego, Calif.[1] (19 m.)				Sault Ste. Marie, Mich. (221 m.)				Seattle, Wash.[1] (27 m.)				Spokane, Wash. (598 m.)				Washington, D. C. (25 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	994	14.8	58	28	1,013	13.9	75	30	984	−2.0	85	31	1,016	5.9	84	31	945	3.9	64	31	1,010	7.5	64
500	31	957	14.9	56	28	957	12.6	52	30	951	−2.0	83	31	959	4.5	79					31	953	5.6	63
1,000	31	902	13.2	50	28	901	11.2	41	30	892	−4.3	80	31	902	1.8	75	31	900	4.4	58	31	896	3.7	62
1,500	31	850	10.3	48	28	849	9.2	34	30	837	−5.4	74	31	847	−1.6	74	31	846	1.2	56	30	842	1.2	67
2,000	31	800	8.2	46	28	799	7.0	27	30	785	−6.9	70	31	795	−4.4	70	31	795	−2.6	57	30	791	−0.9	69
2,500	31	753	6.4	41	28	751	4.4	23	30	736	−8.9	68	31	746	−7.4	65	31	746	−6.5	56	30	743	−3.0	65
3,000	31	708	4.1	39	28	706	1.9	16	30	690	−11.6	67	31	699	−10.2	60	31	699	−9.8	56	30	697	−5.4	62
4,000	31	625	−2.3	35	27	623	−4.2	19	28	605	−16.5	65	31	613	−16.5	57	31	614	−16.2	55	30	613	−11.2	59
5,000	29	550	−8.8	35	27	548	−10.8	29	28	529	−22.6	63	31	536	−22.7	56	30	537	−23.0	54	30	537	−17.1	53
6,000	26	483	−15.7	36	26	480	−17.9	39	28	461	−29.0	59	31	467	−29.5	60	29	468	−29.6	52	29	470	−24.0	51
7,000	22	422	−22.7	35	26	419	−25.4	48	27	400	−36.4	59	31	405	−36.3	66	29	405	−36.3	51	28	408	−30.6	48
8,000	22	368	−29.5	34	13	364	−33.2	----	24	345	−44.1	----	31	350	−43.4	----	29	350	−43.3	----	27	354	−37.1	46
9,000	22	319	−36.7	34	13	315	−40.2	----	20	297	−50.8	----	30	301	−50.4	----	29	301	−49.8	----	27	305	−43.9	----
10,000	21	276	−43.8	----	11	272	−47.0	----	17	254	−55.4	----	27	257	−56.4	----	28	258	−55.3	----	27	262	−49.6	----
11,000	20	237	−50.8	----	10	234	−53.3	----	15	218	−55.6	----	24	220	−60.0	----	27	221	−58.6	----	25	225	−53.9	----
12,000	20	203	−56.0	----	8	198	−58.1	----	14	186	−55.1	----	21	187	−61.5	----	26	188	−59.7	----	25	192	−56.0	----
13,000	18	173	−60.1	----	5	168	−61.3	----	14	159	−54.3	----	16	159	−58.1	----	25	160	−61.5	----	23	164	−56.5	----
14,000	16	147	−62.1	----					8	136	−54.3	----	13	135	−55.7	----	24	137	−62.8	----	22	140	−57.0	----
15,000	14	125	−64.8	----					6	116	−54.3	----	7	115	−55.2	----	24	116	−62.3	----	21	119	−57.3	----
16,000	12	106	−68.1	----									5	98	−55.3	----	19	100	−62.0	----	15	101	−58.9	----
17,000	10	90	−70.9	----													17	85	−62.3	----	11	86	−59.7	----
18,000	8	76	−71.3	----													9	73	−62.5	----	10	74	−59.7	----
19,000																					6	62	−60.7	----

Altitude (meters) m. s. l.	Stations with elevations in meters above sea level																							
	Anchorage, Alaska (42 m.)				Barrow, Alaska (6 m.)				Bethel, Alaska (7 m.)				Fairbanks, Alaska (156 m.)				Juneau, Alaska (49 m.)				Ketchikan, Alaska (26 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	997	−1.3	63	30	1,020	−27.6	90	31	1,002	−8.3	67	31	986	−7.1	57	31	1,003	2.0	73	28	1,007	4.4	77
500	31	941	−4.2	63	30	953	−23.6	91	31	941	−8.6	67	31	944	−8.5	61	31	948	−1.1	75	28	950	1.6	79
1,000	31	883	−6.8	65	30	890	−20.4	91	31	882	−9.5	62	31	885	−11.2	63	31	890	−4.8	76	26	893	−1.9	81
1,500	31	828	−10.3	69	30	832	−20.2	88	31	826	−11.6	58	31	829	−13.0	65	31	835	−8.2	79	26	838	−5.6	82
2,000	31	775	−13.4	71	30	777	−21.1	84	31	774	−14.3	55	31	776	−15.5	65	29	783	−11.1	81	26	785	−9.4	82
2,500	31	726	−16.2	70	30	726	−23.0	80	31	724	−17.2	53	31	726	−18.6	65	28	733	−14.4	80	26	736	−12.4	80
3,000	31	679	−19.7	69	30	678	−25.0	77	31	677	−20.0	52	31	678	−22.0	65	27	686	−17.9	78	26	689	−15.6	79
4,000	29	592	−26.4	67	30	590	−30.8	75	30	591	−26.1	51	30	591	−28.6	65	24	598	−25.1	73	26	602	−22.6	77
5,000	29	515	−33.4	65	30	512	−37.1	75	29	514	−32.5	51	29	513	−35.2	66	23	521	−32.3	68	25	524	−29.2	75
6,000	28	446	−39.7	64	30	442	−43.2	----	28	445	−38.7	52	28	444	−42.4	----	21	451	−39.1	57	22	455	−35.6	74
7,000	28	384	−46.0	----	30	380	−48.8	----	28	384	−44.5	----	28	381	−48.8	----	18	389	−45.4	----	18	393	−42.1	----
8,000	28	330	−49.9	----	30	326	−53.0	----	28	330	−48.7	----	28	327	−53.4	----	13	334	−48.7	----	15	338	−46.5	----
9,000	27	283	−52.5	----	28	279	−53.4	----	28	283	−50.6	----	27	280	−53.9	----	13	286	−49.3	----	13	291	−49.1	----
10,000	27	242	−52.9	----	27	239	−51.2	----	28	243	−50.9	----	26	240	−51.7	----	12	245	−48.9	----	13	249	−50.9	----
11,000	26	208	−52.2	----	26	205	−49.5	----	24	209	−50.5	----	25	206	−50.0	----	8	211	−48.6	----	13	214	−52.4	----
12,000	25	178	−50.8	----	18	176	−48.7	----	22	179	−48.8	----	25	177	−49.6	----	8	181	−47.9	----	10	183	−50.8	----
13,000	22	152	−50.6	----	13	151	−48.4	----	22	154	−48.7	----	23	152	−49.6	----	6	156	−47.1	----	7	157	−48.5	----
14,000	18	130	−50.6	----	9	129	−48.6	----	17	132	−48.6	----	19	130	−50.1	----	6	134	−46.5	----				
15,000	18	112	−50.8	----					9	114	−48.8	----	17	112	−50.6	----	6	116	−47.0	----				
16,000	14	95	−51.2	----									10	95	−51.1	----	5	99	−47.7	----				
17,000	11	82	−51.4	----																				
18,000	6	70	−51.8	----																				
19,000	5	60	−51.9	----																				

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidity in percent, obtained by airplanes and radiosondes during March 1942*—Continued

Altitude (meters) m. s. l.	Stations with elevations in meters above sea level							
	Nome- Alaska (14 m.)				San Juan, P. R. (15 m.			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	1,004	−11.4	72	31	1,014	24.0	83
500	30	943	−12.4	74	31	960	21.3	87
1,000	30	883	−12.3	71	31	906	18.1	85
1,500	30	827	−13.4	69	31	855	15.2	82
2,000	30	774	−15.7	66	31	805	12.7	75
2,500	30	724	−18.1	65	31	759	11.6	58
3,000	30	677	−20.7	63	31	714	9.7	48
4,000	30	590	−26.8	63	30	633	5.5	35
5,000	30	513	−33.1	62	30	560	0.5	29
6,000	30	444	−39.4	63	30	494	−5.9	27
7,000	30	383	−45.2	----	29	434	−12.7	26
8,000	29	330	−49.9	----	28	380	−19.8	25
9,000	28	283	−51.8	----	28	331	−27.1	25
10,000	27	242	−51.8	----	26	287	−34.3	25
11,000	26	208	−51.4	----	24	249	−41.5	----
12,000	25	178	−49.6	----	23	214	−49.0	----
13,000	23	153	−49.0	----	23	184	−56.6	----
14,000	19	132	−48.9	----	22	156	−64.6	----
15,000	18	113	−48.7	----	21	132	−72.3	----
16,000	12	97	−48.7	----	18	111	−78.4	----
17,000	7	84	−48.6	----	14	93	−82.6	----
18,000					12	78	−85.3	----
19,000					10	65	−84.1	----
20,000					6	54	−77.6	----

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Altitude (meters) m. s. l.	Stations with elevations in meters above sea level			
	Barrow, Alaska (6 m.)			
	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	1,016	−19.8	89
500	31	952	−14.2	88
1,000	31	891	−12.6	83
1,500	31	834	−13.1	77
2,000	31	781	−14.7	75
2,500	31	731	−17.0	73
3,000	31	683	−19.6	72
4,000	31	596	−25.5	67
5,000	31	519	−32.0	64
6,000	31	449	−38.5	62
7,000	31	388	−44.8	----
8,000	30	333	−50.0	----
9,000	29	286	−53.0	----
10,000	29	244	−54.2	----
11,000	27	209	−54.6	----
12,000	24	178	−54.7	----
13,000	20	152	−53.6	----
14,000	15	130	−54.0	----
15,000	9	110	−55.0	----
16,000	7	93	−55.8	----

[1] Navy stations.
[2] Makes airplane and radiosonde observations.

NOTES.—All observations taken at 11 p. m. 75th meridian time, except at Norfolk, Va., where they were taken near 7 a. m. 75th meridian time and at Seattle, Wash., where they were taken near 5 a. m. 75th meridian time.

None of the means included in this table are based on less than 15 surface or 5 standard level observations.

Number of observations refers to pressure only, as temperature and humidity data are missing for some observations at certain levels, also, the humidity data are not used in daily observations when the temperature is below −40° C.

TABLE 2.—*Free-air resultant winds based on pilot balloon observations made near 5 p. m. (75th meridian time) during March 1942. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°)—Velocities in meters per second*

Altitude (meters) m. s. l.	Abilene, Tex. (537 m.)			Albuquerque, N. Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (866 m.)			Brownsville, Tex. (7 m.)			Buffalo, N. Y. (220 m.)			Burlington, Vt. (132 m.)			Charleston, S. C. (17 m.)			Chicago, Ill. (192 m.)			Cincinnati, Ohio (152 m.)			Denver, Colo. (1,627 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	30	253	3.2	31	257	3.0	29	260	3.1	29	290	4.4	28	302	5.2	30	318	1.1	31	120	2.1	24	241	3.6	29	279	1.2	28	226	2.5	28	271	3.0	28	239	3.0	29	7	0.6
500							29	246	3.9										31	120	2.2	24	236	6.3	29	261	3.0	28	230	5.4	28	257	4.4	28	237	5.4			
1,000	30	245	3.6				28	248	6.2				28	310	6.6	30	297	1.0	30	308	1.2	19	240	9.4	28	252	4.7	28	243	6.9	23	258	6.1	28	230	7.2			
1,500	30	258	4.4				27	253	7.3	29	281	6.3	20	314	7.2	30	284	2.1	28	300	3.1	11	207	6.4	25	259	5.0	28	261	8.0	22	253	8.0	24	243	9.1			
2,000	29	257	6.2	31	263	4.7	24	268	8.9	29	291	7.2	16	306	7.9	30	281	2.7	25	291	4.5	10	214	5.9	18	274	5.5	25	263	10.4	17	263	9.1	19	254	11.5	29	339	1.1
2,500	28	265	7.9	31	275	4.7	21	272	1.0	28	292	8.9	15	311	11.2	29	284	3.9	25	274	6.2				12	280	10.5	25	259	12.4	16	267	10.8	11	273	10.0	28	287	2.8
3,000	28	267	10.1	31	278	6.4	19	275	14.1	24	295	10.5	15	314	11.9	28	284	5.0	21	269	9.6							23	257	14.5	11	271	15.3				28	285	5.6
4,000	26	270	14.9	26	298	10.2	18	271	17.7	20	300	13.7				22	271	7.1	16	267	13.4							21	259	17.2							24	301	11.1
5,000	24	272	19.9	23	292	12.9	15	266	22.2	18	302	13.2				18	285	8.2	15	268	17.2							16	267	18.5							20	313	15.6
6,000	23	274	21.8	17	306	16.4	11	271	23.9	17	308	15.0				17	281	10.9	14	275	21.9							14	268	23.4							17	314	17.8
8,000	17	277	31.4	12	313	20.5										13	302	14.1	10	274	31.2																13	308	26.5
10,000	10	273	32.4													10	320	23.0																					

Altitude (meters) m. s. l.	El Paso, Tex. (1,196 m.)			Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,413 m.)			Greensboro, N. C. (271 m.)			Havre, Mont. (767 m.)			Jacksonville, Fla. (16 m.)			Las Vegas, Nev. (570 m.)			Little Rock, Ark. (88 m.)			Medford, Oreg. (410 m.)			Miami Fla. (10 m.)			Minneapolis, Minn. (265 m.)			Mobile, Ala. (66 m.)			Nashville, Tenn. (194 m.)		
	Observation	Direction	Velocity	Observation	Direction	Velocity	Observation	Direction	Velocity	Observation	Direction	Velocity	Observation	Direction	Velocity	Observation	Direction	Velocity	Observation	Direction	Velocity	Observation	Direction	Velocity	Observation	Direction	Velocity	Observation	Direction	Velocity	Observation	Direction	Velocity	Observation	Direction	Velocity	Observation	Direction	Velocity
Surface	30	263	3.8	30	340	1.0	30	288	1.3	27	256	3.7	28	270	3.2	29	165	1.2	31	46	1.8	30	260	2.3	31	313	1.3	30	114	1.7	28	312	0.9	25	287	1.0	30	242	2.8
500										27	250	5.4				29	224	4.0				30	271	3.1	31	307	1.2	30	150	2.8	28	269	1.0	25	251	1.5	30	236	5.4
1,000										26	254	6.6	28	265	6.2	29	238	5.0	31	58	0.8	29	258	5.2	31	256	1.1	28	215	2.0	24	241	1.3	23	269	1.6	27	237	6.0
1,500	30	262	4.7							25	260	8.3	27	274	9.0	27	247	6.1	31	297	0.7	29	258	7.8	31	216	2.3	28	259	4.1	22	266	3.6	22	281	2.5	25	248	6.8
2,000	30	255	4.5	30	338	0.9	30	297	1.9	24	254	8.8	26	284	9.6	25	276	8.6	31	271	2.0	28	266	9.0	31	226	2.7	22	271	6.2	16	297	4.7	19	289	7.1	18	264	8.6
2,500	30	261	5.7	30	318	1.9	30	286	2.4	24	263	11.9	25	285	11.6	24	277	10.9	31	269	3.5	26	258	10.8	27	235	2.8	20	268	7.3	13	294	7.6	17	286	8.9	15	272	10.6
3,000	29	265	7.8	29	308	2.8	26	284	3.6	22	275	14.3	23	294	12.0	24	267	12.0	31	285	4.7	22	266	12.1	18	237	3.7	19	265	8.5	11	305	10.1	16	285	10.6	13	273	12.8
4,000	26	279	12.9	23	306	5.4	22	298	6.6	21	276	19.9	17	303	14.4	22	275	15.6	29	307	8.2	16	288	16.1	16	267	5.0	17	276	10.8	10	293	11.3	16	277	16.3	13	276	14.1
5,000	25	284	15.7	21	287	8.8	17	312	11.7	18	278	21.0	14	307	15.1	21	270	18.6	27	304	11.6	10	298	18.4	15	290	7.0	15	272	13.6	10	291	14.7	10	272	21.8			
6,000	22	285	18.0	21	290	11.8	12	312	14.3	17	277	26.2				17	273	24.5	24	302	14.5				11	316	11.7	14	267	18.3									
8,000	18	288	24.1	17	293	18.9				12	280	35.0							19	295	18.6																		
10,000	12	309	30.4	13	309	20.5													16	288	21.5																		
12,000				12	292	25.1													11	283	26.3																		
14,000																			10	286	32.4																		

TABLE 2.—*Free-air resultant winds based on pilot balloon observations made near 5 p. m. (75th meridian time) during March 1942. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°)—Velocities in meters per second*—Continued

Altitude (meters) m. s. l.	New York, N. Y. (15 m.)			Oakland, Calif. (8 m.)			Oklahoma City, Okla. (402 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (338 m.)			Rapid City, S. Dak. (982 m.)			St. Louis, Mo. (181 m.)			San Antonio, Tex. (180 m.)			San Diego, Calif. (15 m.)			Sault St. Marie, Mich. (230 m.)			Seattle, Wash. (12 m.)			Spokane, Wash. (603 m.)			Washington, D. C. (24 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	26	286	2.6	29	264	3.3	30	255	2.8	27	306	4.0	31	245	1.8	29	329	11.0	30	255	3.2	31	59	0.1	29	290	4.1	24	343	1.6	31	224	2.4	30	213	2.7	29	255	2.5
500	24	266	5.9	29	284	1.9	30	251	2.8	27	308	3.9	31	260	2.0				30	264	5.3	31	276	0.3	29	293	3.5	24	344	1.2	31	214	3.2				29	266	3.9
1,000	24	276	7.7	28	286	1.3	29	241	3.0	25	302	5.2	31	254	2.0	29	330	11.0	29	261	7.0	29	254	1.5	29	335	0.8	22	24	2.3	29	206	4.8	30	225	4.3	26	260	8.0
1,500	23	279	9.9	27	292	1.9	28	274	3.9	21	287	6.3	31	265	1.4	29	326	11.5	26	259	8.0	29	256	3.5	25	62	1.4	18	32	3.9	24	215	5.4	29	231	4.8	23	262	11.4
2,000	18	278	9.9	26	293	2.7	26	279	6.6	16	280	7.9	30	279	2.3	29	319	11.5	22	270	9.9	28	272	5.9	22	21	1.3	16	360	3.3	18	211	6.7	26	236	4.9	21	267	12.3
2,500	11	294	11.4	25	313	3.2	23	279	10.4	13	304	10.4	28	291	4.0	24	313	12.8	20	267	10.8	25	273	9.0	20	343	1.5	12	337	7.1	17	220	7.2	23	248	5.4	18	279	13.2
3,000				24	297	5.0	23	280	10.8	12	305	10.0	28	296	5.5	19	318	13.0	17	264	11.5	25	276	11.2	17	312	2.1	12	337	8.2	12	212	9.4	22	259	5.9	15	280	16.3
4,000				23	300	7.9	23	276	14.5	10	307	15.0	27	296	9.8	16	311	13.1				22	270	15.3	15	285	4.3	12	328	10.2				15	266	7.7	13	280	17.3
5,000				19	291	11.6	23	278	16.8				26	300	13.2	14	311	13.4				19	271	19.5	13	273	8.0	11	314	14.6				12	256	10.8	12	279	19.6
6,000				15	292	10.5	20	292	18.6				25	296	16.1	13	314	15.5				16	272	22.5												11	288	23.4
8,000													21	297	20.3	10	321	24.9				12	281	27.3														
10,000													17	291	25.1																							
12,000													11	283	31.4																							

TABLE 3.—*Maximum free-air wind velocities (m. p. s.), for different sections of the United States, based on pilot-balloon observations during March 1942*

Section	Surface to 2,500 meters (m. s. l.)					Between 2,500 and 5,000 meters (m. s. l.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station
Northeast [1]	41.7	W	620	10	Hartford, Conn.	54.8	W	4,080	7	Portland, Maine	72.8	SW	8,620	18	Portland, Maine.
East-Central [2]	49.3	W	2,240	22	Huntington, W. Va.	50.6	WSW	3,860	9	Hatteras, N. C.	74.0	WSW	7,280	17	Huntington, W. Va.
Southeast [3]	38.8	SW	2,320	8	Spartanburg, S. C.	60.0	WNW	4,420	3	Jacksonville, Fla.	67.5	WSW	11,600	6	Miami, Fla.
North-Central [4]	45.0	NW	1,780	6	Rapid City, S. Dak.	43.4	NNW	4,920	8	Bismarck, N. Dak.	71.6	NNW	8,090	1	Rapid City, S. Dak.
Central [5]	44.6	SW	2,310	6	Springfield, Mo.	58.0	NW	4,570	18	Sioux City, Iowa	72.1	WNW	10,710	13	Wichita, Kans.
South-Central [6]	37.4	N	1,770	4	Big Spring, Tex.	43.5	NNW	3,310	2	Lake Charles, La.	83.0	WSW	12,280	27	Abilene, Tex.
Northwest [7]	43.4	WSW	2,110	5	Great Falls, Mont.	40.1	SW	5,000	22	Ellensburg, Wash.	77.4	N	9,310	14	Tatoosh, Wash.
West-Central [8]	43.9	NW	2,500	27	Cheyenne, Wyo.	55.4	NW	4,300	17	Cheyenne, Wyo.	72.0	NW	12,400	16	Redding, Calif.
Southwest [9]	53.2	WNW	2,370	4	El Paso, Tex.	63.0	N	4,440	6	Las Vegas, Nev.	73.0	NW	13,090	5	El Paso, Tex.

[1] Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and Northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, Southern Ohio, Kentucky, Eastern Tennessee, and North Carolina.
[3] South Carolina, Georgia, Florida, and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and Western Tennessee.
[7] Montana, Idaho, Washington, and Oregon.
[8] Wyoming, Colorado, Utah, Northern Nevada, and Northern California.
[9] Southern California, Southern Nevada, Arizona, New Mexico, and extreme West Texas.

RIVER STAGES AND FLOODS

By BENNETT SWENSON

Precipitation during March was above normal in all of the Atlantic States, the East Gulf drainage, the Great Lakes Region, and in the Central-Northern States. Floods occurred in portions of New York and Pennsylvania, in the Southeastern States, southern Michigan, and in portions of the Ohio Basin. The floods were unusually severe in Michigan and in the Oconee and Ocumlgee Rivers in Georgia, where previous maximum stages were equaled or exceeded in some instances, otherwise the floods were mostly light to moderate.

St. Lawrence drainage.—Excessive flooding occurred in the streams of the lower Michigan Peninsula during March as the result of two storms and mild temperatures. On March 8–9, rains and heavy, melting snow caused rapidly rising river stages and some flooding from ice jams as the ice moved out. The high water continued until March 16, when additional heavy rains were general over this area. The heavy rains and rising temperatures, together with the remaining frost that left the ground, released great quantities of water into the already swollen streams and caused flooding in most of the rivers.

In the Grand River, stages approached, but did not equal, the high stages recorded in 1904. The crest stage reached at Grand Rapids, Mich., was 16.1 feet on March 20, with the lower sections of the city being inundated. The losses, confined principally to highways, and small dwellings in North Park and Comstock Park, were estimated at about $63,000.

The entire Saginaw River Basin was in flood with the highest stages of record being equaled or exceeded at some points. The peak stage of 19 feet at Vassar, Mich., on the Cass River, equaled the record stage in the flood of 1904.

The Maumee River system in northern Indiana and Ohio experienced two rises during March, but stages only slightly above flood stage were reached.

Heavy rains on March 16–17 caused severe local flooding in western New York. A report of the storm is given on page 61, in this REVIEW under the heading, "Severe Local Storms."

Atlantic Slope drainage.—A general rise occurred in the Susquehanna basin as the result of snow melt from a moderately heavy fall on the 3rd and 4th and light to moderate rain on the night of March 8–9. General flooding resulted in the upper basin down to, and including Towanda, Pa.

On the 16th–17th, heavy rains in the drainage above, and moderate rains below, Towanda produced a second flooding. In this case the overflow again was confined to

the upper basin but did not extend much below Vestal, N. Y. At the end of the month stream heights were near normal and ground water conditions greatly improved.

Floods prevailed generally in the Southeastern States from eastern North Carolina southward. The floods were severe in the Ocmulgee and Oconee Rivers, the stage at Macon, Ga., on the Ocmulgee River, equaling the previous maximum stage of 26 feet, which occurred in February 1929. Otherwise, the floods were mostly light to moderate.

The rainfall, which was well above normal, was fairly well distributed throughout the month. In the upper watersheds of the Oconee and Ocmulgee Rivers, the rainfall during the month averaged 9 to 10 inches in the former and 10 to 12 inches in the latter basin. The floods in these rivers developed into major proportions following heavy rains on March 20–21.

East Gulf of Mexico drainage.—Precipitation, occurring at frequent intervals throughout the month, was well above normal in practically the entire drainage. Rainfall amounts in general were heaviest on March 16–17 and 20–21. Light to moderate overflows resulted in most of the streams during the latter half of the month. Losses were not great; livestock and the lumber interests, mainly, were affected.

Missouri River Basin.—The Grand River was in moderate flood at Chillicothe and Gallatin, Mo., during the month, but bankful stage was not reached in the lower reaches. Due to the early date there was little or no crop damage and the stages were not high enough to cause property damage.

Some overflow of the lowlands occurred along the Missouri River in North Dakota where ice gorges formed between March 12 and 24. However, no damage resulted.

Upper Mississippi River Basin.—The Illinois River continued in flood at Havana and Beardstown, Ill., from the previous month until March 7. Another flood of lesser intensity began upstream at Morris, Ill., on March 17 and the river was still above bankful at Havana and Beardstown at the end of March.

The ice in the upper Mississippi River had gradually disintegrated during the last 2 weeks of February and a general movement of the ice took place during the first week of March. At La Crosse, Wis., the ice began to move on March 6 and by the 15th, navigation was possible up to Lake Pepin, the Spring break-up occurring about 15 days earlier than the average.

Ohio River Basin.—The Ohio River began to rise in the upper portion early in the month from light rain falling on melting snow. As the rise progressed downstream it was augmented by additional rains during the middle of the month. Bankful stages were closely approximated, reached or exceeded in the reach of the river from a short distance below Louisville, Ky., to the mouth. Damage from the flooding was minor as the stages were comparatively low and it was too early in the season to affect prospective crops to any great extent.

Due to the wet condition of the soil, moderately heavy rains on the night of March 8 caused a minor flood in the French Broad River at Asheville and Hot Springs, N. C.

In the Wabash River Basin, the streams had fallen to low stages from the high waters of February, and continued low during the first week of March. However, a general, heavy rain occurred on March 8–9, averaging about 1.35 inch. Slight flooding resulted in the upper Wabash and in the West Fork of the White. Additional rains on the 13–17th affected the stages in the middle and lower channels. The later crests, as affected by these rains, occurred in the lower channels generally around the 19th to 21st.

The following report relative to the flooding in the upper Ohio basin is submitted by the official in charge at Pittsburgh:

The moderately high waters during the period March 9 to 19 were the result of melting snow and ice gorge, and a succession of southwest storms. Flood stages were experienced only on the Allegheny River. Pittsburgh was out of pool from noon March 9 to 6 p. m. March 21 and had four crests during that period, namely, 23.3 feet at 8 a. m., 10th; 20.0 feet at 5 a. m., 13th; 20.6 feet at 1 p. m., 15th; and 22 feet at 7:30 p. m. on the 17th. Flood stage was exceeded at Warren, Pa., and Lock Nos. 4, 5, and 8 on the Allegheny River. Minor damage was reported on French Creek in the vicinity of Meadville, Pa., and on the Allegheny River at Warren, Pa. The principal damage was to summer cottages, flooded cellars and washouts on the highway.

The first rise of the period was the result of melting snow from the storm of March 2–3. The snow was general over the Upper Ohio Basin and averaged about 12 inches, with an average water content of about 1.2 inches. The run-off from the melting snow was gradual, beginning on the 7th and reaching the crest on the 9th and 10th. The temperatures during this period (7 a. m. of the 7th to 7 a. m. of the 9th) were above freezing for most stations. The mid-day temperatures on the 5th and 6th averaged 43 and 35 degrees, respectively. The snow cover during this period was compacted somewhat, but the run-off resulting was very local. Data from a snow survey made during this period showed that the snow cover had a high water content and that part next to the ground surface was saturated. In addition to the run-off from the melting snow, rain was general over the basin above Pittsburgh on the morning of March 8–9, and averaged about 0.3 inch. An ice gorge on the Allegheny River in the vicinity of Lock No. 9 also aggravated the condition on that stream. The gorge broke during the morning of the 9th, and as a result, there was running ice on the Allegheny from Lock No. 9 to Pittsburgh, Pa. The second and third rises were caused by moderate rain, with the river above normal. The rain averaged about 0.5 inch on the 12th and 0.8 inch on the 14th. There was also some snow melt from the headwaters of the Allegheny Basin. The fourth rise was rather abnormal in its run-off characteristics. The rainfall was from thundershowers, with a duration of two to four hours, was simultaneous over the basin, and averaged about 0.8 inch. The storm occurred between noon and 4 p. m. of the 16th and the larger amounts were over the Allegheny and Ohio Basins.

This rainfall produced rapid run-off and double crest on the Allegheny River above Lock No. 4. Although there were no excessive stages reported during the period, March 9–19, the "continued near flood stage condition" of the rivers gave the public much concern, owing to a marked parallel with the antecedent conditions of the March 1936 flood.

Estimated flood losses and savings, March 1942 [1]

River and drainage	Tangible property	Matured crops	Prospective crops	Livestock and other movable farm property	Suspension of business	Total losses	Total savings
ST. LAWRENCE							
Grand River in Michigan	$63,575				$1,250	$64,825	$185,000
Saginaw River	52,400	$5,000		$25,000	3,350	85,750	10,000
ATLANTIC SLOPE							
Pee Dee River	5,230		$780	2,400	19,150	27,560	13,000
Santee River			3,100	3,000	24,000	30,100	18,700
Savannah River					1,500	1,500	5,000
EAST GULF OF MEXICO							
Tombigbee-Black Warrior River					5,000	5,000	10,000
Pascagoula River	2,500		300	3,300	7,500	13,600	8,500
MISSISSIPPI SYSTEM							
Ohio Basin							
Allegheny River	3,500					3,500	
Ohio River	5,000		10,000	3,000	11,000	29,000	175,000

[1] Data in connection with floods in Susquehanna, Ocmulgee, and Oconee Rivers not available.

Lower Mississippi Basin.—Heavy rains on March 7–8, caused slight flooding in the basins of the White, Ouachita, and Petit Jean Rivers, all in Arkansas.

Some flooding occurred also in the St. Francis River Basin in Arkansas, the Coldwater River in Mississippi, and the Sulphur River in Texas, but with no appreciable damage.

FLOOD-STAGE REPORT, MARCH 1942

[All dates in March unless otherwise specified]

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ST. LAWRENCE DRAINAGE					
Lake Michigan					
Red Cedar:	*Feet*			*Feet*	
Williamston, Mich	7	9	9	7.2	9
		17	18	8.3	17
East Lansing, Mich	8	9	9	8.0	9
		17	19	9.6	18
Grand:					
Lansing, Mich	11	17	18	11.9	18
Ionia, Mich	21	17	20	23.1	18
Lowell, Mich	15	17	21	17.6	19
Grand Rapids, Mich	15	19	21	16.1	20
Lake Huron					
Flint:					
Columbiaville, Mich	10	9	12	11.9	9
		17	20	13.1	18
Flint, Mich	11	17	20	13.0	17
Cass: Vassar, Mich	14	8	10	15.0	8
		16	19	19.0	18
Shiawassee: Owosso, Mich	7	12	12	7.2	12
		16	18	9.0	17
Tittabawassee: Midland, Mich	18	17	20	20.9	18
Saginaw: Saginaw, Mich	19	18	23	21.0	20
Lake Erie					
St. Marys: Decatur, Ind	13	9	11	13.8	9
St. Joseph:					
Fort Wayne, Ind	12	17	19	12.5	18
Montpelier, Ohio	10	7	13	11.5	10
		17	20	11.8	18
Maumee: Fort Wayne, Ind	15	17	18	15.0	17–18
ATLANTIC SLOPE DRAINAGE					
Nashua: East Pepperell, Mass	8	11	11	8.1	11
Tioughnioga: Whitney Point, N. Y	12	9	10	12.3	10
		16	18	14.6	17
		20	20	12.3	20
		22	22	12.3	22
Chenango:					
Sherburne, N. Y	8	9	10	9.0	9
		16	19	9.2	17
Greene, N. Y	8	9	10	8.9	10
		17	19	10.9	18
Binghamton, N. Y	16	18	19	16.3	18
Chemung:					
Corning, N. Y	16	9	10	[1] 17.6	9
Elmira, N. Y	12	9	10	15.9	10
		17	18	13.2	18
Chemung, N. Y	12	9	10	17.5	10
		17	19	14.8	18
Susquehanna:					
Oneonta, N. Y	12	9	11	[1] 14.2	10
		17	24	18.0	18
Bainbridge, N. Y	12	17	20	16.0	18
Vestal, N. Y	14	9	11	17.1	10
		17	20	18.1	18
Towanda, Pa	16	10	10	17.2	10
Roanoke: Williamston, N. C	10	15	15	10.0	15
Neuse: Smithfield, N. C	13	10	12	13.2	10
Cape Fear: Lock No. 2, Elizabethtown, N. C	22	10	13	25.4	11
Lynches: Effingham, S. C	14	16	18	14.3	17
Pee Dee:					
Cheraw, S. C	30	10	11	[1] 34.0	11
Mars Bluff Bridge, S. C	17	5	19	18.5	8–9
				20.0	15
		24	27	17.5	25–26
Poston, S. C	18	10	22	20.1	17
Black: Kingstree, S. C	12	9	13	12.2	9–12
		24	25	12.1	25
Saluda:					
Pelzer, S. C	6	9	11	7.0	10
		15	16	6.5	16
		21	22	6.8	26
Chappels, S. C	13	17	18	17.9	17
		21	23	22.8	22
Broad: Blairs, S. C	14	3	4	16.0	4
		9	10	16.6	10
		21	22	16.3	22
Catawba:					
Catawba, N. C	8	10	10	8.6	10
Catawba, S. C	11	9	9	13.9	9
Wateree: Camden, S. C	23	10	11	25.0	10
Santee: Rimini,[2] S. C	12	[3]	[4]	15.4	14
Broad: Carlton, Ga	15	21	22	16.3	21

See footnotes at end of table.

FLOOD-STAGE REPORT, MARCH 1942—Continued

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE—continued					
Savannah:	*Feet*			*Feet*	
Augusta, Ga	32	23	23	32.0	23
Butler Creek, Ga	21	22	25	24.5	23
Clyo, Ga	11	[3]	[4]	20.0	29
Ogeechee:					
Midville, Ga	6	22	28	7.7	26
Dover, Ga	7	[3]	[4]	8.9	14
				9.4	26
				9.9	29
Ocmulgee:					
Macon, Ga	18	21	24	26.0	22
Hawkinsville, Ga	25	24	28	32.0	25
Abbeville, Ga	11	10	13	11.4	11
		23	[4]	17.8	27–28
Lumber City, Ga	15	29	[4]	19.6	31
Oconee:					
Milledgeville, Ga	20	21	26	31.6	22
Dublin, Ga	21	24	30	[1] 27.5	26
Mount Vernon, Ga	16	24	[4]	20.9	28
Altamaha:					
Charlotte, Ga	12	[3]	[4]	16.4	13
				23.7	31
Everett City, Ga	10	3	[4]	13.9	Apr. 5
EAST GULF OF MEXICO DRAINAGE					
Chattahoochee:					
West Point, Ga	19	22	23	20.2	22
Columbus, Ga	34	22	23	38.0	22
Eufaula, Ala	40	22	25	[1] 45.3	24
Columbia, Ala	42	24	25	42.4	24
Flint:					
Montezuma, Ga	20	24	26	21.4	25
Albany, Ga	20	25	30	27.1	28
Bainbridge, Ga	25	28	[4]	27.9	31
Apalachicola:					
River Junction, Fla	20	25	28	22.4	27
Chattahoochee, Fla	20	24	28	22.3	27
Blountstown, Fla	15	[3]	[4]	22.1	27–28
Oostanaula: Rome, Ga	25	22	23	27.0	23
Etowah:					
Canton, Ga	17	22	22	19.1	22
Cartersville, Ga	18	21	23	24.5	22
Coosa:					
Mayos Bar Lock, Ga	28	23	24	29.4	23
Gadsden, Ala	20	23	26	20.7	24
Wetumpka, Ala	45	21	21	45.8	21
Cahaba:					
Centerville, Ala	23	21	22	30.0	21
Marion Junction, Ala	36	24	24	36.8	24
Alabama:					
Montgomery, Ala	35	22	26	40.8	23
Millers Ferry, Ala	40	23	31	47.4	27
Black Warrior:					
Lock No. 10, Tuscaloosa, Ala	47	21	22	48.2	21
Lock No. 7, Eutaw, Ala	35	21	28	43.3	24
Tombigbee:					
Lock No. 4, Demopolis, Ala	39	20	[4]	51.3	24–25
Lock No. 3, Ala	33	[3]	9	38.4	7
		19	[4]	53.6	25
Lock No. 2, Ala	46	21	[4]	54.8	27
Lock No. 1, Ala	31	[3]	10	32.2	8
		21	[4]	37.0	29–30
Chickasawhay:					
Enterprise, Miss	20	21	24	27.4	22
Shubuta, Miss	26	21	29	34.4	25
Pascagoula: Merrill, Miss	22	26	[4]	23.2	29
Pearl:					
Jackson, Miss	18	14	20	19.4	17
		23	30	19.2	28
Monticello, Miss	15	22	22	15.2	22
Pearl River, La	12	8	13	12.4	10–11
		24	[4]	14.0	28
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Illinois:					
Morris, Ill	13	17	21	15.8	18
Peru, Ill	17	17	24	19.4	18
Peoria, Ill	18	21	25	18.6	23
Havana, Ill	14	[3]	4	18.7	Feb. 19
		19	[4]	16.2	23–25
Beardstown, Ill	14	[3]	7	20.8	17–18
		18	[4]	17.2	24–26
Missouri Basin					
Grand:					
Gallatin, Mo	20	7	7	21.1	7
		26	27	23.4	27
Chillicothe, Mo	18	6	9	25.6	7
		26	28	24.6	27
Ohio Basin					
Allegheny:					
Warren, Pa	12	18	18	12.5	18
Lock No. 8, Mosgrove, Pa	24	10	10	24.8	10
		17	19	25.7	18
		10	11	26.0	10
Lock No. 5, Schenley, Pa	24	15	15	24.1	15
		16	20	26.5	17
Lock No. 4, Natrona, Pa	24	10	10	24.4	10
		17	19	25.0	17
Lock No. 3, Acmetonia, Pa	25	18	18	25.0	18

FLOOD-STAGE REPORT, MARCH 1942—Continued

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
MISSISSIPPI SYSTEM—continued					
Ohio Basin—Continued					
	Feet			*Feet*	
Tygart: Dailey, W. Va.	9	9	9	9.3	9
Rough Creek: Dundee, Ky.	25	18	18	25.2	18
West Fork of White:					
Anderson, Ind.	10	9	11	11.1	10
		16	18	13.0	17
Elliston, Ind.	18	11	13	19.0	12
		17	21	20.6	19
Edwardsport, Ind.	12	10	25	17.5	14
				18.5	21
White:					
Petersburg, Ind.	16	13	24	18.9	16
Hazleton, Ind.	16	13	25	19.3	17
Wabash:					
Wabash, Ind.	12	9	12	13.5	11
		17	18	12.8	18
LaFayette, Ind.	11	9	15	15.8	12
		16	22	16.2	10
Covington, Ind.	16	10	16	19.4	13
		17	23	19.6	20
Terre Haute, Ind.	14	10	24	15.8	15–16
				15.9	22
Mount Carmel, Ill.	17	15	25	18.7	18
Cumberland: Celina, Tenn.	28	20	20	28.0	20
French Broad:					
Asheville, N. C.	6	9	9	6.9	9
Hot Springs, N. C.	8	9	9	10.0	9
Tennessee: Kingston, Tenn.	26	(2)	(4)	45.4	9
Ohio:					
Dam No. 7, Midland, Pa.	30	10	10	31.4	10
Tell City, Ind.	38	19	20	38.0	19
Dam No. 47, Newburgh, Ind.	38	16	26	41.1	20–22
Evansville, Ind.	37	17	25	38.9	21–22
Dam No. 48, Cypress, Ind.	38	17	26	40.2	21–23
Mount Vernon, Ind.	35	17	27	38.0	23
Dam No. 49, Uniontown, Ky.	37	18	27	39.3	23–24
Shawneetown, Ill.	33	16	29	39.2	23–24
Dam No. 50, Fords Ferry, Ky.	34	16	30	41.4	24–25
Dam No. 52, Brookport, Ill.	37	20	28	39.9	25

FLOOD-STAGE REPORT, MARCH 1942—Continued

River and station	Flood Stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
MISSISSIPPI SYSTEM—continued					
Ohio Basin—Continued					
Ohio—Continued.	*Feet*			*Feet*	
Dam No. 53, Grand Chain, Ill.	42	20	29	45.2	5
Cairo, Ill.	40	19	30	43.4	25
White Basin					
Black: Black Rock, Ark.	14	9	13	16.0	10
White:					
Georgetown, Ark.	21	11	15	21.1	11–12
				21.1	14–15
Clarendon, Ark.	26	8	25	26.9	17–19
St. Charles, Ark.	25	2	3	25.0	2–3
		6	7	25.0	6–7
		10	31	25.6	20–22
Arkansas Basin					
North Canadian: Yukon, Okla.	8	2	(4)	8.9	17–20
Petit Jean: Danville, Ark.	20	9	12	21.6	11
Red Basin					
Ouachita:					
Arkadelphia, Ark.	17	9	10	19.5	9
Camden, Ark.	26	11	18	30.2	14
Sulphur: Naples, Tex.	22	8	16	23.5	15
Lower Mississippi Basin					
Big Lake Outlet: Manila, Ark.	10	(3)	29	12.0	Feb. 28–Mar. 2
St. Francis: St. Francis, Ark.	18	16	20	18.1	16–18
Coldwater: Coldwater, Miss.	13	(3)	1	15.3	Feb. 25
		9	21	14.5	108
		28	28	13.1	28
Mississippi: New Madrid, Mo.	34	25	26	34.1	26

[1] Estimated.
[2] Affected by backwater from dam.
[3] Continued from preceding month.
[4] Continued into following month.

CLIMATOLOGICAL DATA

CONDENSED CLIMATOLOGICAL SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS

[For description of tables and charts, see REVIEW, January 1941, pp. 30-31]

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Section	Temperature								Precipitation					
			Monthly extremes								Greatest monthly		Least monthly	
	Section average	Departure from the normal	Station	Highest	Date	Station	Lowest	Date	Section average	Departure from the normal	Station	Amount	Station	Amount
	°F.	°F.		°F.			°F.		In.	In.		In.		In.
Alabama	55.5	−0.5	Geneva	85	16	Cordova	22	4	7.28	+1.53	Livingston	11.71	Hytops	3.86
Arizona	48.0	−3.6	2 stations	97	31	Alpine	−6	2	.48	−.60	Bright Angel	2.38	2 stations	.00
Arkansas	53.0	+.4	Magnolia	89	16	Irons Forks	18	1	3.05	−.65	Magnolia	7.42	Mountainburg	.88
California	50.1	−1.2	Cow Creek	98	31	Ellery Lake	−15	15	1.98	−1.71	Ben Lomond	6.11	Iron Mountain	.04
Colorado	31.4	−3.2	Tow Buttes	80	23	Taylor Park	−31	21	1.17	−.15	Cumbres	5.93	Karval	.03
Florida	63.0	−2.2	Arcadia	94	15	Vernon	24	3	6.13	+2.95	Caryville	10.47	Pompano	1.43
Georgia	55.0	−1.2	2 stations	89	16	Hollywood	10	1	8.10	+3.24	Covington	12.29	Camp Stewart	4.59
Idaho	32.8	−3.1	Orofino	79	31	Island Park Dam	−24	20	.82	−.95	Deception Creek	5.02	Arco	.00
Illinois	44.1	+3.3	Jacksonville	81	16	Freeport	15	1	2.91	−.21	Herod	6.45	Freeport	.84
Indiana	43.4	+2.7	Scottsburg	81	16	Marengo	12	1	4.00	+.32	Waterloo	6.44	Notre Dame	1.76
Iowa	38.3	+3.7	2 stations	77	[1] 23	Corning	5	1	1.96	+.24	Sibley	3.83	Melrose	.86
Kansas	44.4	+1.0	Jetmore	83	24	Scott City	11	1	1.45	+.02	Garnett	3.49	Tribune	.39
Kentucky	48.4	+2.1	Pikeville	85	16	Lynch (near)	15	[1] 3	1.44	−.22	Henderson	7.53	Grant	2.28
Louisiana	58.2	−2.3	2 stations	86	14	Franklinton	24	1	5.48	+.81	Port Sulphur	8.92	Shreveport	3.02
Maryland-Delaware	44.6	+2.0	4 stations	79	17	Oakland, Md.	5	2	5.89	+2.26	Snow Hill, Md.	10.42	Mt. Savage Summit, Md.	3.29
Michigan	35.3	+3.8	Benton Harbor	69	26	Kenton	−17	12	3.44	+1.37	Gaylord	5.63	St. James	.43
Minnesota	33.1	+6.5	2 stations	66	25	Meadowlands	−10	12	2.34	+1.14	Pigeon River Bridge	7.89	Cass Lake	.89
Mississippi	56.0	−.9	do	85	14	Kosciusko	25	4	6.31	+.60	Hickory	11.74	Rochdale	3.98
Missouri	45.8	+1.8	Union	84	16	Chillicothe	8	1	2.05	−1.12	Parma	4.95	St. Thomas (near)	.60
Montana	32.7	+1.4	Trout Creek (near)	71	30	2 stations	−22	20	.74	−.23	Heron	2.76	Opheim	.10
Nebraska	37.5	+1.0	2 stations	79	23	Sidney	1	1	1.70	+.59	Lincoln (College View).	3.78	Sidney	.20
Nevada	39.2	+1.4	do	90	31	Seventy One Ranch	−12	5	.61	−.38	Lehman Caves N. M.	2.42	2 stations	.00
New England	36.7	+4.5	5 stations	66	8	First Conn Lake, N. H.	−3	21	6.04	+2.63	Mount Carmel, Conn.	8.66	Gilman, Vt.	2.60
New Jersey	42.2	+3.0	2 stations	72	[1] 8	Runyon	16	13	5.73	+1.96	Sussex	7.27	Newton	3.75
New Mexico	40.4	−3.3	Carlsbad	84	[1] 23	Gavilan	−19	17	.48	−.29	Irvin's Ranch	3.00	7 stations	.00
New York	36.4	+4.4	Poughkeepsie	73	8	2 stations	4	11	4.36	+1.27	Cutchogue	9.27	Utica	1.69
North Carolina	51.0	+1.1	2 stations	87	17	Mount Mitchell	8	[1] 3	5.44	+1.25	Rock House	11.12	Elkin	2.81
North Dakota	30.0	+6.1	4 stations	66	22	Hannah	−8	30	1.83	+1.05	Courtenay	4.17	Dickinson Airport	.30
Ohio	42.2	+3.4	3 stations	83	16	Bellefontaine	12	4	3.30	−.08	Warren No. 1	5.54	Norwalk	2.19
Oklahoma	50.7	−.1	Tipton	90	15	Kenton	16	[1] 2	1.29	−.84	Smithville	5.87	Bristow	.28
Oregon	39.7	−1.4	2 stations	80	[1] 29	Olive Lake	−7	14	1.25	−1.49	Valsetz	8.47	Redmond	.00
Pennsylvania	40.1	+2.5	do	75	[1] 17	Ebensburg	4	2	4.20	+.69	Conshohocken	6.43	Millville	2.01
South Carolina	55.0	+.3	3 stations	88	[1] 16	2 stations	19	[1] 1	7.17	+3.27	Edgfield	10.15	Charleston Airport	4.25
South Dakota	34.0	+2.7	2 stations	75	23	do	−4	1	1.93	+.81	Wessington Springs	5.51	2 stations	.19
Tennessee	50.6	+1.2	do	85	[1] 15	Greenville	11	4	5.10	−.23	Morgan Springs	7.76	Tri-City Airport	2.08
Texas	56.7	−1.8	Laredo	99	14	Muleshoe	13	2	1.15	−.88	Bon Wier	6.00	7 stations	.00
Utah	33.6	−4.8	St. George	85	30	Woodruff	−15	4	1.30	−.12	Rice Canyon	4.45	Fort Duchesne	T
Virginia	47.2	+1.5	Columbia	85	11	Mountain Lake	11	2	4.21	+.55	Newchurch	9.04	Moore's Creek Dam	.29
Washington	41.6	−.1	3 stations	80	[1] 30	Bumping Lake	9	15	2.14	−1.29	Big Four	13.03	6 stations	.00
West Virginia	44.1	+1.7	Madison	89	16	Bayard	0	2	3.64	−.25	Pickens	7.63	Harrison County Airport.	1.66
Wisconsin	33.8	+4.5	Darlington	71	25	Rest Lake	−16	12	2.28	+.54	Rhinelander	5.75	Platteville	.73
Wyoming	28.5	−1.4	Yoder	72	2	Foxpark	−26	7	.64	−.50	Dome Lake	2.25	Kemmerer	.00
Alaska [February]	19.2	+11.5	View Cove	51	19	Allakaket	−40	[1] 8	1.98	+.10				
Hawaii	67.4	−1.6	Waianae	87	[1] 15	Volcano Observatory.	41	8	21.86	+13.72	Puohakamoa No. 2	17.75	Waiopai Ranch	.00
Puerto Rico	76.0	+2.5	2 stations	95	[1] 25	2 stations	52	[1] 13	2.23	−1.37	Maricao	7.22	Santa Isabel	.00

[1] Other dates also.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch, or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Thunderstorms
	Ft.	Ft.	Ft.	In.	In.	In.	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	%	In.	In.		Miles								0–10	In.	In.	
New England							37.0	+5.6									76	5.12	+2.5											6.5			
Eastport	75	67	85	29.74	29.83	−0.10	35.2	+6.3	53	9	40	23	11	30	20	32	29	82	4.13	+0.3	12	11.5	e.	46	e.	3	8	9	14	6.2	9.2	0.0	0
Greenville, Maine	1,070	6	41	28.66	29.84		29.2	+4.3	54	29	39	2	1	19	46	27	25		4.41	+1.2	11		nw.				4	8	19		22.5	.0	0
Portland, Maine [1]	103	5	36	29.72	29.84	−.12	36.0		63	8	45	16	29	28	38	31	25	69	5.67	+2.6	15	10.1	w.	38	se.	9	9	13	9	5.5	14.3	T	0
Concord [2]	289	54	72	29.53	29.85	−.15	36.8	+6.0	63	8	45	16	29	28	38	31	25	69	5.67	+2.6	15	9.1	nw.	37	ne.	3	7	13	11	6.0	14.3	T	0
Burlington [2]	403	11	48	29.39	29.84	−.16	35.4	+6.3	57	8	42	22	10	29	26	32	28	77	2.89	+.8	16	8.5	nw.	34	se.	9	6	2	23	7.6	13.0	.0	0
Northfield	876	12	60	28.89	29.86	−.14	33.5	+7.1	58	8	41	15	5	26	34				4.01	+1.4	16	7.6	sw.	32	sw.	9	6	2	23	7.7	29.3	1.0	0
Boston [1]	124	33	62	29.72	29.85	−.12	39.7	+4.2	65	8	47	30	29	34	26	35	29	69	7.01	+3.4	12	13.1	w.	47	ne.	3	4	12	15	6.8	7.9	.0	1
Nantucket	12	10	63	29.85	29.86	−.12	39.8	+4.4	56	8	45	31	1	34	19	36	33	82	7.42	+3.7	14	13.0	w.	40	e.	3	10	7	14	5.8	T	.0	0
Block Island	26	11	46	29.84	29.86	−.12	39.8	+4.4	54	8	45	31	13	34	16	36	32	78	6.20	+2.4	13	18.3	w.	56	se.	3	10	13	8	5.1	T	.0	0
Providence [2]	159	46	60	29.69	29.87	−.11	41.8	+6.1	66	8	49	31	29	35	24	35	30	75	7.98	+4.5	13	10.3	nw.	38	sw.	9	5	11	15	6.8	1.6	.0	0
Hartford [1]	159	5	44	29.68	29.86	−.13	40.4		62	8	49	27	11	32	31	35	30	72	6.13	+2.2	13	10.5	nw.	38	s.	9	3	10	18	7.2	2.3	.0	1
New Haven [2]	107	74	153	29.76	29.88	−.11	41.2	+5.4	58	27	48	30	7	35	22	36	32	79	8.01	+3.9	15	10.0	nw.	33	s.	22	5	9	17	6.7	1.8	.0	0
																														6.3		
							44.8	+4.2									69	4.87	+1.5														
Middle Atlantic States																																
Albany [1]	97	26	40	29.75	29.86	−.15	38.0	+8.2	64	8	46	23	29	30	31	33	28	72	4.01	+1.4	16	11.5	w.	42	s.	9	3	9	18	7.1	13.3	.0	1
Binghamton	871	57	79	28.92	29.86	−.16	38.0	+5.4	65	8	46	23	5	30	33	34	29	74	3.32	+.7	19	6.9	w.	28	sw.	9	3	7	21	8.0	11.0	T	2
New York	314	415	454	29.52	29.87	−.13	42.9	+5.2	65	8	50	31	30	36	22	37	30	66	6.76	+3.1	14	17.9	nw.	66	nw.	22	6	9	16	6.5	.8	.0	1
Harrisburg [1]	374	30	49	29.47	29.88	−.15	42.8		66	8	52	26	2	34	35	37	31	69	3.14	+.1	14	10.2	w.	40	sw.	9	5	9	17	7.1	10.2	T	1
Philadelphia [2]	114	174	367	29.76	29.88	−.14	44.8	+4.0	70	17	52	33	30	37	32	38	33	71	4.84	+1.4	13	14.6	s.	53	sw.	9	8	10	13	5.9	2.5	.0	1
Reading	323	47	306	29.53	29.88		43.4	+2.8	68	9	51	30	25	36	33				4.85	+1.3	13	14.2	nw.	51	s.	9	8	7	16	5.9	3.3	.0	1
Scranton	805	72	104	29.02	29.86	−.16	40.1	+4.4	66	8	48	26	13	32	34				2.98	−.2	14	7.7	nw.	27	nw.	9	3	11	17	7.0	10.1	T	1
Atlantic City	52	37	172	29.83	29.89	−.13	43.4	+4.8	61	18	50	32	24	37	24	38	33	72	5.22	+1.6	15	18.9	w.	59	ne.	29	10	5	16	5.6	T	.0	1
Trenton	190	89	107	29.67	29.88		43.3	+4.2	68	8	51	32	11	35	27	38	32	69	5.47	+2.1	13	10.8	nw.	38	s.	9	8	10	13	6.3	1.7	.0	1
Baltimore [2]	123	100	215	29.76	29.89	−.14	47.0	+4.7	76	17	55	33	29	39	35	39	33	66	6.50	+2.8	13	12.6	sw.	45	sw.	9	10	6	15	6.1	22.2	6.0	0
Washington [1]	112	62	85	29.82	29.90	−.14	47.4	+4.8	76	17	56	30	2	39	33	40	33	65	5.96	+2.2	14	9.9	nw.	42	w.	9	8	10	13	5.8	11.5	T	0
Cape Henry	18	8	54	29.88	29.90		47.4	+4.8	76	17	56	30	2	41	36	44	40	75	6.13	+2.3	14	13.4	sw.	43	nw.	22	11	8	12	5.5	.0	.0	3
Lynchburg	686	144	184	29.17	29.92	−.13	49.0	+2.4	82	17	57	31	2	41	38	41	32	58	3.25	−.3	14	10.0	nw.	35	sw.	9	10	8	13	5.9	2.5	.0	1
Norfolk [2]	91	80	125	29.81	29.91	−.12	49.6	+2.3	77	14	60	28	2	39	38	41	35	75	5.52	+1.8	15	12.2	sw.	37	s.	9	11	6	14	6.0	.0	.0	6
Richmond [2]	144	11	52	29.75	29.90	−.14	51.1	+2.9	80	17	59	35	30	43	31	44	39	75	5.52	+1.8	12	10.4	nw.	44	w.	9	10	9	12	5.6	T	.0	1
							49.2	+2.0	80	17	60	31	2	38	36	41	35	70	5.15	+1.5	12												
																														5.4		
							55.8	+1.8									71	5.94	+2.2														
South Atlantic States																																
Asheville	2,253	89	104	27.58	29.96	−.10	47.2	+2.3	76	16	57	26	3	37	39	40	34	67	4.69	+.7	15	10.8	nw.	33	nw.	3	9	8	14	6.1	16.0	.0	2
Charlotte [2]	779	63	86	29.09	29.92	−.13	53.2	+2.8	80	14	63	29	1	43	33	44	39	70	6.30	+2.1	14	8.9	sw.	31	sw.	9	10	8	13	5.4	2.9	.0	2
Greensboro [1]	886	6	56	28.98	29.93		49.2		77	15	60	29	2	38	37	42	36	68	4.92		10	10.3	sw.	37	sw.	8	10	7	14	5.7	5.8	.0	2
Hatteras	11	5	50	29.92	29.93	−.11	54.7	+2.7	72	16	61	38	1	48	41	50	48	84	5.72	+1.5	12	15.1	sw.	45	se.	2	14	7	10	4.8	.0	.0	3
Raleigh [1]	376	27	69	29.52	29.92	−.13	52.8	+3.9	80	14	64	31	2	41	41	45	38	65	5.04	+1.2	11	11.8	sw.	38	w.	3	9	9	13	5.6	.6	.0	1
Wilmington	72	73	107	29.88	29.95	−.10	56.8	+3.5	80	15	66	31	1	47	30	49	44	72	5.44	+2.3	11	11.8	sw.	41	s.	8	11	11	9	5.2	.0	.0	2
Charleston [2]	48	11	92	29.91	29.96	−.10	58.1	+.7	81	15	66	34	4	50	25	50	45	75	4.92	+1.9	12	11.1	sw.	44	se.	2	9	10	12	5.8	.0	.0	1
Columbia, S. C. [2]	347	70	91	29.57	29.94	−.12	56.2	+1.0	83	16	66	30	1	46	34	49	44	72	6.12	+2.7	12	9.8	s.	32	sw.	8	15	6	10	4.6	.0	.0	1
Greenville, S. C. [1]	1,040	70	78	28.83	29.94		51.2		77	14	62	24	4	41	35	44	37	67	5.88	+.7	14	9.7	sw.	38	ne.	2	12	6	13	5.5	8.0	.0	4
Augusta [2]	182	62	77	29.76	29.95	−.11	56.9	+.9	85	16	67	34	4	47	34	47	40	64	9.54	+5.4	9	7.2	nw.	27	w.	2	9	13	7	4.9	.0	.0	5
Savannah [2]	65	23	152	29.91	29.98	−.08	60.2	+1.2	84	15	70	36	4	50	27	50	45	71	5.67	+2.6	11	11.1	s.	44	s.	2	9	11	11	5.6	.0	.0	4
Jacksonville [2]	43	86	110	29.95	30.00	−.06	62.0	−.6	86	16	71	40	1	53	24	53	49	76	6.05	+3.1	12	8.2	se.	36	sw.	2	8	11	12	5.9	.0	.0	6
																														5.7		
							68.9	−1.0									80	3.64	+1.6														
Florida Peninsula																																
Key West [2]	21	10	64	29.95	29.98	−.07	72.2	−.4	84	18	78	51	1	67	20	67	65	83	2.74	+1.4	12	11.7	se.	34	nw.	2	13	11	7	4.4	.0	.0	2
Miami [2]	25	124	168	29.96	29.99	−.09	70.4	+.2	85	18	76	46	1	64	24	63	60	80	2.51	+.3	7	11.7	se.	29	s.	5	8	14	9	5.6	.0	.0	2
Tampa [1]	35	5	61	29.96	30.00	−.07	64.1	−2.7	81	15	72	40	1	56	25	58	54	77	5.68	+3.2	10	11.6	e.	35	sw.	5	9	9	13	5.9	.0	.0	3
																														5.7		
							56.9	−1.5									72	8.19	+3.0														
East Gulf States																																
Atlanta [1]	1,173	5	72	28.72	29.96	−.10	52.0		78	16	62	29	4	42	33	45	39	68	11.51	+6.1	12	12.2	nw.	37	nw.	9	10	5	16	6.1	3.7	.0	6
Macon [2]	370	79	87	29.58	29.97	−.09	55.0	−1.7	83	16	66	32	1	44	35	47	40	66	7.78	+2.8	10	8.4	nw.	25	nw.	3	10	11	10	5.5	T	.0	4
Thomasville	273	49	58	29.72	30.02	−.04	57.3	−2.9	82	14	68	29	1	46	32				9.92	+5.8	12						4	8	10	13		.0	.0	5
Apalachicola	35	11	51	29.95	29.99		58.4	−3.2	72	23	65	40	3	52	23	54	50	80	9.24	+5.0	11	10.2	se.	33	nw.	2	11	5	15	5.8	.0	.0	6
Pensacola	56	54	79	29.92	29.98	−.08	57.8	−2.5	74	23	65	37	3	51	27	53	48	76	8.00	+3.2	15	9.3	se.	31	w.	8	11	4	16	6.2	.0	.0	6
Anniston	741	9					54.0	+1.5	79	16	65	28	1	42	35				7.73	+2.1	15		nw.				9	12	10	9		7.1	.0	5
Birmingham [2]	700	11	48	29.22	29.97	−.09	54.8	−.6	78	16	64	32	3	45	32	46	41	70	5.85	+.2	11	9.5	s.	30	se.	13	12	4	15	5.5	2.5	.0	4
Mobile [2]	57	6	30	29.93	29.98	−.08	57.5	−2.2	77	14	66	33	3	49	29	51	47	76	7.43	+1.4	15	11.4	s.	29	nw.	2	11	4	16	5.8	.0	.0	4
Montgomery [2]	218	92	105	29.75	29.98	−.08	56.4	−1.4	79	15	66	33	2	47	27	49	43	70	8.27	+2.3	9	8.7	s.	25	w.	8	10	6	15	5.7	T	.0	4
Meridian [2]	375	67	92	29.56	29.97	−.08	56.2	−.9	82	14	67	33	2	48	27	47	43	73	5.48	−.1	13	8.1	s.	40	sw.	17	14	7	10	4.6	T	.0	5
Vicksburg [2]	247	82	102	29.68	29.95	−.09	57.4	−1.1	83	14	67	33	3	53	26	54	48	71	7.33	+2.6	10	8.3	se.	27	sw.	8	10	4	17	6.0	.0	.0	5
New Orleans [2]	53	76	84	29.92	29.98	−.06	61.2	−1.6	82	17	69	39	3	53	26	54	48	71	7.33	+2.6	10	8.3	se.	27	sw.	8	10	4	17	6.0	.0	.0	5
																														5.3		
							57.9	−1.0									65	1.86	−1.1														
West Gulf States																																
Shreveport [1]	249	92	227	29.68	29.94	−.08	57.2	−.1	85	13	68	32	3	46	35	49	43	67	3.02	−1.1	9	12.3	s.	36	nw.	2	14	4	13	5.3	T	.0	3
Bentonville	1,303	12	51	28.56	29.94	−.07	47.9	+.6	74	15	59	21	1	37	34				1.52	−2.5	6		nw.	25	s.	6	13	14	3	3.8	.5	.0	1
Fort Smith	463	57	82		29.90	−.11	52.9	+.3	80	15	64	31	3	42					1.53	−1.5	5	8.9	e.	34	nw.	16	15	9	7			.0	2
Little Rock [2]	357	94	102	29.54	29.93	−.10	54.1	+1.1	80	16	64	32	2	44	33	46	40	66	4.14	−.5	10	9.7	nw.	27	w.	16	11	10	10	5.3	3.0	.0	3
Austin [2]	605	68	90	29.30	29.94		59.8	−.9	89	13	72	32	3	48	40	49	40	58	.66	−1.6	5	11.0	s.	31	nw.	7	12	8	11	5.2	.0	.0	3
Brownsville [2]	57	88	96	29.85	29.91		65.6	−2.6	83	13	74	42	2	58	30	59	55	74	.33	−.9	2	12.7	se.	38	n.	8	8	8	15	5.9	.0	.0	0
Corpus Christi [2]	20	11	78	29.92	29.94	−.04	64.4	−.6	85	17	72	41	2	57	29	57	52	73	.97	−.6	2	12.7	s.	34	n.	21	11	8	12	5.5	.0	.0	2
Dallas [1]	512	6	46	29.38	29.93		56.6	−.8	86	12	70	30	3	43	41	46	36	54	1.94	−.9	6	14.8	s.	44	s.	6	14	8	9	4.4	.5	.0	0
Fort Worth [1]	679	35	56	29.21	29.93	−.05	56.2	−.5	85	12	70	31	2	43	38	46	36	54	1.37	−1.0	5	15.2	s.	41	sw.	6	15	5	11	4.8	6.0	.0	1
Galveston [2]	54	106	114	29.90	29.96	−.05	59.0	−3.4	76	17	64	40	2	54	22	54	51	80	3.19	+.5	6	12.2	s.	36	nw.	8	9	7	15	6.2	.0	.0	1
Houston [2]	138	157	190	29.81	29.96		60.6	−2.7	88	13	70	39	2	51	28	52	47	70	1.91	−1.6	7	12.8	se.	33	nw.	8	8	9	14	6.2	.0	.0	1
Palestine	510	64	72	29.41	29.94	−.06	57.5	−1.6	85	13	68	34	8	47	30	48	38	55	1.24	−2.2	7	10.3	s.	27	nw.	8	12	10	9	4.9	T	.0	0
Port Arthur	34	59	134	29.92	29.96		59.3		81	17	67	38	3	52	26	53	48	73	3.90	+.6	11	15.1	s.	40	nw.	8	8	10	13	6.3	.0	.0	2
San Antonio [1]	693	26	59	29.21	29.94	−.04	61.4	−1.4	90	13	75	33	2	48	46	51	41	57	.29	−1.6	3	10.3	se.	38	nw.	1	12	6	13	5.3	.0	.0	0

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch, or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Thunderstorms
	Ft.	Ft.	Ft.	In.	In.	In.	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	°F.	%	In.	In.		Miles								0–10	In.	In.	
Ohio Valley and Tennessee							45.9	+3.0										72	3.96	−0.3										6.9			
Chattanooga [1]	762	21	54	29.14	29.96	−.10	50.2	------	79	16	63	22	4	38	42	43	38	71	6.09	------	15	8.5	s.	36	sw.	30	9	6	16	6.3	T	.0	5
Knoxville [2]	995	66	84	28.88	29.95	−.11	50.2	+1.5	81	16	62	22	4	38	39	42	36	67	5.02	−.0	12	8.8	sw.	35	sw.	8	8	6	17	6.5	13.0	.0	4
Memphis [2]	399	78	86	29.50	29.92	−.12	53.6	+1.3	80	15	64	29	1	43	34	47	42	71	5.56	+.3	12	9.5	s.	24	nw.	9	13	5	13	5.0	T	.0	4
Nashville [1]	546	5	72	29.34	29.93	−.12	50.5	------	80	16	62	26	1	39	37	44	38	68	3.82	−1.3	13	10.8	s.	39	sw.	16	6	7	18	6.6	.9	.0	6
Lexington	989	6	----	28.85	29.94	−.11	46.4	+2.7	80	16	58	23	4	35	37	----	----	----	4.11	−2.1	14	----	s.	----	----	----	10	7	14	5.8	1.5	.0	4
Louisville [2]	525	106	120	29.33	29.90	−.15	48.6	+3.2	82	16	58	29	4	40	33	41	35	71	4.48	+.1	14	10.6	sw.	42	s.	16	6	9	16	6.6	T	.0	5
Evansville [1]	431	5	38	29.43	29.90	−.14	46.8	------	78	16	57	24	1	36	36	41	36	72	5.06	+.9	12	10.4	nw.	36	sw.	7	4	10	17	7.0	T	.0	6
Indianapolis [3]	823	98	129	28.98	29.87	−.17	44.0	+4.0	75	16	52	28	31	36	32	38	34	80	4.35	+.4	13	9.5	w.	32	nw.	22	5	7	19	7.8	5.3	.0	1
Terre Haute [3]	575	68	149	29.27	29.90	------	45.2	------	76	16	54	25	1	37	30	39	35	77	3.99	+.2	15	11.2	sw.	36	sw.	16	4	10	17	7.3	7.8	.0	3
Cincinnati [3]	627	11	51	29.21	29.89	−.17	45.8	+4.9	78	16	55	28	4	37	34	40	34	71	2.64	−1.2	13	9.7	sw.	33	w.	9	5	5	21	7.4	1.2	.0	3
Columbus [3]	822	90	110	28.99	29.88	−.16	43.6	+4.5	73	16	52	25	4	35	34	37	32	73	2.50	−.9	14	12.1	w.	51	s.	16	4	4	23	7.5	1.2	.0	1
Dayton [3]	900	186	213	28.91	29.88	------	43.8	+3.3	75	16	52	27	4	35	32	37	33	76	2.75	−.9	11	12.6	w.	40	w.	9	5	5	21	7.5	2.1	T	1
Elkins [3]	1,947	61	78	27.84	29.92	−.13	42.1	+2.1	70	17	53	14	2	31	44	35	30	72	3.61	−.2	18	8.7	w.	30	w.	22	2	6	23	7.9	15.1	.0	0
Parkersburg	637	77	84	29.21	29.90	−.15	45.3	+2.5	81	16	55	26	4	36	37	39	33	67	3.14	−.4	14	7.6	sw.	32	nw.	22	6	10	15	6.8	6.7	.0	2
Pittsburgh [1]	842	39	54	28.97	29.88	−.16	41.0	+2.8	68	17	50	26	4	32	30	35	31	74	4.31	+1.3	16	13.5	w.	46	sw.	9	3	12	16	6.8	18.3	1.5	1
Lower Lake Region							37.3	+5.0										79	3.57	+0.9									7.8			
Buffalo [3]	768	243	280	29.01	29.85	−.17	36.1	+5.0	62	27	42	24	4	30	31	32	29	81	3.79	+1.2	17	17.2	sw.	66	w.	9	3	5	23	8.0	13.7	.7	1
Canton	448	10	61	29.34	29.83	------	34.3	+6.6	61	8	42	14	7	26	33	31	28	81	3.17	+.7	18	10.1	w.	38	w.	9	4	6	21	7.7	12.8	.0	0
Ithaca	836	77	100	----	----	----	37.3	+5.5	63	27	44	21	7	30	31	----	----	----	4.90	+2.6	18	10.2	nw.	38	se.	21	3	6	22	8.1	21.7	.5	2
Oswego	335	71	85	29.48	29.85	−.16	36.3	+5.1	58	8	42	23	7	31	25	33	29	75	4.18	+1.6	14	11.2	w.	29	w.	10	6	7	18	7.1	8.7	.1	2
Rochester [1]	523	5	69	----	29.86	−.16	35.6	------	62	27	42	19	7	29	----	----	----	----	5.24	+2.6	20	13.5	w.	50	w.	9	4	7	20	----	18.4	1.1	2
Syracuse [1]	596	5	51	29.19	29.85	−.17	37.3	+7.6	61	8	45	23	7	30	31	33	30	79	4.52	+1.5	19	11.6	sw.	41	sw.	9	2	8	21	7.8	14.8	.1	2
Erie [2]	714	57	81	29.08	29.87	−.15	37.4	+3.9	67	27	43	24	4	32	30	33	31	84	3.22	+.6	15	9.6	w.	34	w.	9	3	9	19	7.5	11.6	T	1
Cleveland [1]	762	27	54	29.02	29.86	−.17	39.2	------	69	17	47	18	4	31	34	34	31	77	3.47	+.8	18	13.3	w.	49	sw.	9	4	4	23	7.9	8.8	2.3	1
Sandusky	629	5	67	----	----	----	40.0	+4.9	71	16	48	24	4	32	38	----	----	----	2.34	−.4	17	11.3	sw.	34	sw.	17	4	4	23	7.9	3.2	.0	1
Toledo [3]	628	79	87	29.16	29.86	−.17	38.6	+3.3	67	16	45	24	4	32	35	34	30	78	3.02	+.5	14	11.9	w.	35	w.	9	5	5	21	7.5	2.5	.0	1
Fort Wayne [1]	857	69	84	28.92	29.86	------	38.8	+2.7	69	16	47	21	30	31	33	34	32	84	2.59	−.6	15	11.2	w.	43	nw.	9	5	4	22	7.6	4.1	.0	1
Detroit [1]	730	5	78	29.05	29.86	−.17	38.5	------	64	17	45	25	4	32	30	34	30	76	2.38	.0	16	12.0	nw.	42	sw.	17	3	4	24	8.3	2.2	.0	1
Upper Lake Region							33.8	+5.8										80	3.14	+1.0									7.6			
Alpena	609	5	89	29.15	29.84	−.19	31.0	+5.5	46	31	37	9	13	26	24	29	27	85	3.92	+1.9	12	12.6	nw.	44	nw.	9	5	7	19	7.3	19.8	.0	2
Escanaba	612	51	72	----	29.86	−.18	30.8	+6.6	47	23	37	9	13	25	----	----	----	78	3.52	+1.6	19	11.7	nw.	42	nw.	9	4	6	21	----	26.4	.0	0
Grand Rapids [3]	707	70	244	29.05	29.83	−.20	38.0	+4.6	57	25	44	26	9	32	22	32	29	80	3.84	+1.4	14	13.0	sw.	43	sw.	17	5	8	18	7.3	12.2	.0	1
Lansing	878	5	90	28.88	29.85	------	36.8	+4.6	57	17	44	21	4	30	24	32	28	78	4.70	+2.4	16	10.3	nw.	27	sw.	17	3	7	21	7.9	10.7	.0	1
Marquette	734	44	73	29.04	29.85	−.19	31.0	+6.2	44	23	36	13	6	26	19	28	25	80	3.14	+.9	14	8.5	nw.	32	nw.	9	5	5	21	7.5	17.3	T	1
Sault Sainte Marie [3]	614	11	52	29.15	29.84	−.19	28.2	+6.6	49	27	35	7	13	21	30	26	24	86	2.99	+1.2	16	12.7	nw.	50	nw.	9	5	7	19	7.3	19.5	.8	0
Chicago	673	7	131	29.11	29.85	−.18	39.6	+4.3	66	20	45	26	28	34	27	35	30	71	2.68	+.1	16	11.4	w.	36	nw.	9	4	6	21	7.9	9.1	.0	1
Green Bay	617	109	141	29.14	29.82	−.22	34.6	+6.0	54	23	40	20	1	29	25	31	28	79	2.80	+.8	15	11.4	w.	40	nw.	9	4	6	21	7.6	12.1	T	2
Milwaukee [1]	681	33	66	29.09	29.84	−.19	36.4	+6.3	55	23	42	21	1	30	25	32	29	81	1.46	−1.0	12	13.8	nw.	38	w.	20	3	8	20	7.7	1.8	.0	2
Duluth	1,133	5	47	28.61	29.86	−.20	31.4	+7.7	46	23	37	14	12	26	24	25	22	82	2.34	+.8	17	14.2	ne.	41	nw.	21	3	8	20	7.9	21.5	T	0
North Dakota							31.2	+9.4										79	1.64	+0.8									7.2			
Fargo [1]	940	50	58	28.82	29.86	−.22	33.8	+11.1	61	23	42	17	11	25	35	30	26	78	1.88	+.9	11	13.1	nw.	35	nw.	26	5	8	18	7.5	3.6	T	0
Bismarck [1]	1,647	4	41	28.11	29.92	−.14	31.4	+9.5	66	22	41	4	1	22	44	28	23	76	1.18	+.3	9	13.9	nw.	49	nw.	10	6	6	19	7.5	11.3	1.0	0
Devils Lake	1,478	11	44	28.27	29.88	−.17	29.2	+9.4	56	22	36	10	27	22	29	27	25	87	2.14	+1.4	12	10.4	nw.	33	n.	27	5	6	20	7.8	16.8	5.2	0
Lemmon, S. Dak.	2,602	4	38	27.15	29.94	------	29.8	------	63	22	38	4	1	21	42	28	24	----	1.11	------	9	------	nw.	----	----	----	3	3	24	----	12.3	T	0
Grand Forks	832	11	71	28.95	29.88	------	30.8	------	57	23	39	9	11	22	30	28	26	----	2.42	------	10	------	nw.	----	----	----	4	10	17	----	10.7	2.0	0
Williston	1,878	42	50	27.93	29.96	−.18	30.4	+7.5	62	22	39	5	30	22	33	27	23	76	1.12	+.4	13	8.9	nw.	34	nw.	10	11	8	12	6.1	11.5	T	0
Upper Mississippi Valley							41.3	+4.4										74	2.14	−0.4									7.3			
Minneapolis-St. Paul, Minn [1]	919	32	61	28.81	29.82	−.23	35.8	------	62	25	43	19	12	29	29	32	27	74	1.74	+.3	13	12.0	nw.	34	se.	25	4	7	20	7.6	4.6	.0	0
Springfield, Minn.	1,025	4	42	28.72	29.84	------	35.3	------	62	24	43	18	28	28	28	32	28	----	3.34	------	12	------	nw.	----	----	----	4	8	19	----	11.7	T	2
La Crosse [3]	714	11	48	29.04	29.82	−.22	37.6	+6.1	68	25	45	19	1	31	35	32	28	76	2.76	+1.2	14	6.3	w.	22	w.	21	3	5	23	8.2	2.8	.0	3
Madison [3]	974	70	78	28.76	29.83	−.21	36.6	+6.0	60	25	42	22	1	31	24	32	28	77	.86	−1.2	15	9.5	nw.	26	nw.	9	3	6	22	7.8	.9	.0	1
Charles City	1,015	10	51	28.74	29.85	−.20	36.2	+5.5	67	25	44	18	1	29	32	33	29	79	3.31	+1.5	12	8.0	nw.	22	nw.	21	7	5	19	7.2	4.1	.0	2
Davenport [3]	606	66	----	29.19	29.87	−.16	40.6	+4.5	73	24	48	25	1	33	31	35	31	76	1.42	−.9	12	11.3	w.	32	nw.	21	3	6	22	8.0	1.7	.0	1
Des Moines [3]	860	5	99	28.91	29.85	−.19	39.4	+3.5	72	23	46	22	28	32	35	34	30	76	2.01	+.2	7	12.3	nw.	30	nw.	21	3	3	21	7.3	2.7	.0	3
Dubuque	699	60	79	29.08	29.84	−.20	39.4	+5.4	70	25	46	21	1	32	31	24	29	70	1.12	−.9	9	7.4	nw.	25	nw.	21	3	5	23	8.0	.3	.0	2
Burlington, Iowa	702	6	35	29.09	29.85	------	40.7	+2.1	75	24	49	23	29	32	35	31	73	1.86	−.9	9	11.4	w.	34	w.	21	5	6	20	7.5	.5	.0	3
Cairo	358	87	93	29.52	29.91	−.13	50.3	+3.1	76	15	60	31	1	41	27	----	----	----	3.07	−.7	14	10.1	s.	32	s.	16	8	9	14	6.2	.2	.0	4
Peoria [3]	609	11	45	29.19	29.86	−.17	41.7	+4.7	76	16	50	23	30	33	37	36	33	78	2.58	−.2	13	8.2	w.	26	s.	16	8	11	12	5.8	.7	.0	1
Springfield, Ill.	636	5	191	29.18	29.88	−.15	44.4	+4.2	77	16	53	28	30	36	36	38	34	79	1.82	−1.4	11	12.9	nw.	38	s.	16	4	8	19	7.5	1.2	.0	4
St. Louis [3]	568	179	303	29.27	29.88	−.15	47.0	+2.9	80	16	56	29	30	38	37	40	33	61	1.92	−1.5	13	13.7	nw.	44	sw.	16	8	8	15	6.2	1.8	.0	2
Missouri Valley							40.6	+2.4										73	2.13	+0.9									6.4			
Columbia, Mo. [3]	784	6	66	29.04	29.89	−.14	45.3	+2.7	75	23	55	25	29	36	31	38	32	70	2.56	−.4	9	9.3	w.	30	sw.	16	8	10	13	6.0	.2	.0	4
Kansas City [1]	963	38	76	28.84	29.89	−.13	44.9	------	77	23	55	27	1	35	37	38	31	64	2.62	+.1	6	13.0	nw.	41	nw.	8	10	5	16	6.1	T	.0	5
St. Joseph [3]	967	11	49	28.84	29.89	------	42.5	+2.0	77	23	51	25	1	34	34	37	33	79	1.79	−.7	7	11.6	nw.	36	w.	28	9	5	17	6.1	.2	.0	2
Springfield, Mo. [1]	1,324	5	60	28.49	29.90	−.12	45.8	+.6	78	15	56	25	29	35	31	38	32	65	1.04	−2.4	5	14.5	nw.	44	sw.	16	12	5	14	5.5	.4	.0	2
Topeka	987	65	87	28.82	29.88	------	44.4	+1.8	77	23	54	26	31	34	38	38	31	65	1.01	−1.1	7	10.6	nw.	31	se.	19	9	8	14	6.1	T	.0	2
Lincoln [3]	1,189	11	81	28.60	29.89	−.13	40.2	+2.7	74	23	48	25	30	32	32	35	31	75	3.00	+1.8	13	12.5	nw.	37	nw.	27	8	7	16	6.4	.9	.0	3
Omaha [1]	1,105	31	44	28.68	29.88	−.16	38.8	+2.7	76	23	47	15	3	31	36	34	30	76	1.50	+.1	10	14.4	nw.	42	nw.	10	4	10	17	7.2	3.7	.0	4
Valentine	2,598	46	54	27.16	29.93	−.10	33.8	+1.5	67	23	43	13	1	25	37	30	25	75	1.96	+.9	7	11.1	nw.	34	nw.	25	9	7	15	6.3	15.6	T	2
Sioux City [1]	1,138	5	27	28.64	29.88	−.17	37.0	------	71	24	46	17	28	28	39	33	29	77	2.33	------	11	13.0	nw.	36	nw.	26	8	7	19	7.3	1.9	.0	3
Huron [1]	1,301	26	41	28.46	29.88	−.18	34.0	+5.1	71	23	42	13	28	26	40	31	28	82	3.41	+2.5	10	15.6	nw.	43	nw.	10	4	6	21	7.5	9.4	.2	1
Northern Slope							34.7	+2.6										67	0.78	−0.2									6.1			
Billings [1]	3,570	18	39	26.26	29.99	------	35.7	------	66	31	45	12	25	26	38	30	22	60	.98	------	6	13.3	sw.	54	nw.	6	6	14	11	6.1	5.2	.0	0
Havre	2,507	11	67	27.31	30.00	−.00	32.8	+5.7	66	31	43	12	16	23	40	30	24	70	1.14	+.6	11	8.7	sw.	26	nw.	5	6	10	15	6.4	11.1	.0	0
Helena [1]	4,124	5	35	25.76	30.06	+.05	32.6	+.9	60	31	42	14	15	23	36	28	23	68	.51	−.3	9	8.8	w.	49	w.	5	5	10	16	6.7	7.5	.0	0
Missoula [3]	3,205	80	91	26.63	30.07	------	37.6	+2.0	69	31	47	21	26	28	38	31	26	71	.33	−.6	5	5.8	sw.	37	w.	5	4	10	17	7.4	3.2	.0	0
Kalispell	2,973	48	56	26.91	30.02	+.03	35.2	+2.3	59	31	44	20	26	27	32	31	26	72	.49	−.5	8	7.8	nw.	34	nw.	6	8	8	15	6.5	7.7	.0	0
Miles City [3]	2,371	48	55	27.44	29.98	−.04	35.4	+6.8	65	31	45	15	27	26	37	30	25	74	.59	−.3	8	10.7	nw.	35	nw.	6	7	13	11	5.6	4.2	.0	0
Rapid City [3]	3,259	50	58	26.51	29.94	−.07	35.8	+3.2	64	22	45	18	30	26	37	29	22	64	.55	−.4	5	15.2	nw.	39	nw.	7	9	12	10	5.3	10.9	T	0
Cheyenne [1]	6,094	5	39	23.86	29.95	−.01	32.0	------	58	31	44	10	20	20	38	26	17	56	1.02	.0	9	5.0	sw.	21	n.	18	14	9	8	4.7	8.3	.0	0
Lander	5,352	60	68	24.57	30.00	+.01	30.9	−1.5	59	31	43	5	7	19	35	26	18	61	.80	−.4	6	5.0	sw.	21	n.	18	14	9	8	4.7	8.3	.0	0
Sheridan [3]	3,790	6	42	26.04	29.99	------	34.0	+2.6	65	31	44	15	20	24	40	30	23	67	.72	−.4	9	11.2	nw.	43	nw.	3	5	10	16	6.7	7.4	.0	0
North Platte [3]	2,821	11	51	26.94	29.91	−.09	37.9	+1.3	71	23	49	10	1	27	41	32	26	70	1.41	+.6	7	9.5	nw.	32	n.	25	11	12	8	4.6	6.2	.0	1

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch, or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Thunderstorms
	Ft.	Ft.	Ft.	In.	In.	In.	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	°F.	%	In.	In.		Miles								0–10	In.	In.	
Middle Slope							44.4	+1.1										59	1.08	−0.2										4.9			
Denver [1]	5,292	106	113	24.61	29.92	−.03	38.1	+.3	64	22	48	14	7	28	33	30	20	54	.91	−.1	6	8.2	s.	34	ne.	6	14	10	7	4.3	10.2	.0	1
Pueblo [1]	4,690	5	36	25.17	29.91	−.01	39.4	.....	71	23	55	13	4	24	47	30	20	55	.89	+.3	5	9.5	w.	42	n.	6	14	7	10	4.5	5.8	.0	0
Concordia	1,392	50	58	28.40	29.90	−.11	42.5	+1.5	76	23	52	23	31	32	37	37	30	66	2.11	+.9	8	10.0	nw.	30	s.	24	10	9	12	5.7	3.2	.0	2
Dodge City	2,509	10	86	27.27	29.89	−.08	44.8	+2.0	81	24	58	24	21	31	44	36	28	59	1.19	+.3	9	12.3	nw.	40	s.	24	13	5	13	5.2	2.4	.0	2
Wichita [1]	1,358	6	64	28.44	29.89	−.10	45.7	+.6	76	23	58	24	31	34	37	38	31	65	.88	−.9	5	16.7	nw.	43	s.	25	11	8	12	5.2	T	.0	3
Oklahoma City [2]	1,214	10	47	28.62	29.91	−.07	51.0	+1.0	82	15	63	30	2	39	38	41	31	56	.53	−1.4	5	10.6	s.	33	s.	19	15	9	7	4.3	.8	.0	2
Southern Slope							53.0	−1.6										45	0.26	−0.6										4.3			
Abilene [2]	1,738	10	56	28.09	29.90	−.06	56.4	−.1	88	15	70	30	2	43	40	43	29	45	.43	−.9	5	12.2	s.	34	se.	24	13	8	10	4.6	T	.0	1
Amarillo [2]	3,676	10	49	26.14	29.88	−.07	44.0	−2.9	79	24	58	18	2	30	43	36	27	58	.42	−.3	5	15.3	sw.	50	nw.	25	14	12	5	4.3	7.5	.0	0
Del Rio	960	63	71	28.90	29.89	−.06	62.6	−.9	88	14	76	34	9	50	44	48	32	38	.01	−.7	1	10.9	se.	41	nw.	1	11	11	9	4.9	.0	.0	0
Roswell	3,566	75	85	26.28	29.89	−.01	49.0	−2.3	80	23	64	22	21	34	47	38	22	40	.17	−.6	1	9.7	s.	45	w.	15	18	9	4	3.3	1.6	.0	0
Southern Plateau							56.1	−1.2										39	0.23	−0.3										3.3			
El Paso [2]	3,778	82	101	26.10	29.88	.00	54.1	−1.7	80	24	67	26	8	41	39	40	22	34	.02	−.3	1	9.2	w.	35	nw.	15	16	12	3	3.4	.1	.0	0
Albuquerque [1]	5,314	5	45	24.65	29.89	.....	43.3	.....	69	23	57	17	7	30	39	33	20	44	.39	−.1	4	9.2	w.	38	nw.	19	13	12	6	4.3	7.1	.0	0
Phoenix [2]	1,107	39	87	28.76	29.92	+.01	59.1	−1.6	90	31	74	35	1	44	41	44	28	40	.28	−.4	2	6.2	e.	34	nw.	6	17	8	6	3.2	.0	.0	0
Tucson [1]	2,555	5	23	27.29	29.90	.....	55.8	.....	85	31	72	28	8	40	43	43	28	41	.23	−.5	1	.....	se.	.....	.....	.....	16	8	7	3.7	.0	.0	0
Yuma	142	9	54	29.79	29.94	.00	63.0	−1.1	95	31	78	41	8	48	45	49	31	36	.17	−.2	2	7.1	w.	28	nw.	6	24	4	3	1.9	.0	.0	0
Independence	3,957	5	26	25.95	30.00	+.06	48.1	−.4	76	30	63	23	14	33	40	36	15	...	.27	−.2	2	.....	nw.	.....	.....	.....	18	9	4	.....	2.9	.0	0
Middle Plateau							58.1	−2.4										55	0.72	−0.3										5.1			
Reno [2]	4,527	61	76	25.46	30.05	−.07	40.8	−.3	70	30	54	20	26	28	38	32	22	57	.53	−.3	4	6.2	w.	28	w.	31	12	14	5	4.1	2.0	.0	0
Tonopah	6,090	9	20	23.99	29.98	.....	39.9	.....	66	29	52	18	14	28	34	32	21	...	.46	.....	3	.....	nw.	.....	.....	.....	13	13	5	.....	2.0	.0	0
Winnemucca	4,339	5	56	25.63	30.05	+.04	38.3	−1.7	70	31	52	12	26	25	39	32	21	53	.54	−.4	4	7.9	ne.	30	nw.	5	8	7	16	6.2	1.4	.0	0
Modena	5,473	10	46	.....	.....	.....	36.6	−1.6	68	31	51	12	27	22	44	.....	.....	...	.69	−.3	6	9.4	sw.	35	sw.	13	12	8	11	4.7	4.5	.0	1
Salt Lake City [1]	4,227	86	47	25.61	30.07	+.09	35.8	−4.2	67	31	46	17	15	26	37	32	25	68	1.54	−.3	8	7.7	se.	34	nw.	6	9	11	11	5.4	11.4	.0	0
Grand Junction	4,602	60	68	25.34	29.94	.00	39.2	−4.4	65	31	50	20	7	28	32	32	20	48	.56	−.2	7	6.3	se.	27	nw.	6	12	6	13	5.2	3.7	.0	1
Northern Plateau							41.9	+0.2										62	0.47	−0.6										6.5			
Baker [2]	3,471	36	54	26.47	30.10	+.07	36.6	−1.0	64	30	47	16	14	26	31	31	25	68	.47	−.6	6	6.2	se.	31	sw.	31	9	9	13	5.9	5.3	.0	0
Boise [1]	2,739	5	49	27.21	30.09	+.06	40.2	.....	70	31	51	19	26	29	33	35	27	63	.52	.....	6	10.9	se.	34	se.	31	11	10	10	5.4	3.5	.0	1
Pocatello [1]	4,478	5	31	25.47	30.09	+.08	31.8	.....	63	31	43	10	2	21	40	28	21	67	.30	.....	4	8.4	sw.	34	w.	5	7	13	11	6.2	1.2	.0	0
Spokane [1]	1,929	27	42	27.98	30.05	+.04	39.6	−.1	70	30	51	21	19	29	36	34	27	62	.48	−.7	6	7.4	ne.	42	sw.	5	6	10	15	6.9	1.3	.0	0
Walla Walla	991	57	65	28.99	30.06	+.04	47.0	+.9	79	30	57	30	13	37	34	.....	.....	...	1.02	−.6	10	6.5	s.	27	sw.	5	4	7	20	7.6	T	.0	0
Yakima	1,076	58	67	28.90	30.06	.....	44.4	+.3	73	30	56	26	14	32	33	37	26	51	.02	−.4	1	5.5	nw.	27	w.	2	3	13	15	6.8	T	.0	0
North Pacific Coast Region							46.2	+1.0										74	2.60	−1.5										7.6			
North Head	211	5	56	29.86	30.10	+.09	45.4	+.2	64	30	51	33	24	40	19	43	40	83	4.76	−.8	22	13.2	s.	49	s.	21	2	12	17	7.4	T	.0	0
Seattle [2]	125	90	321	29.94	30.08	+.09	46.8	+1.9	69	30	54	33	15	40	25	41	36	71	2.09	−1.0	14	9.7	se.	40	sw.	21	3	8	20	7.7	.0	.0	0
Tacoma	194	172	201	29.88	30.09	+.09	45.6	+1.4	67	30	53	31	15	38	28	.....	.....	...	2.22	−1.3	17	8.5	sw.	34	sw.	5	2	7	22	8.0	.5	.0	0
Tatoosh Island	86	9	61	29.96	30.06	+.10	44.4	+1.5	64	31	48	34	22	40	16	42	38	77	5.71	−2.1	23	15.5	s.	54	s.	16	4	6	21	7.8	T	.0	0
Medford [1]	1,329	29	58	28.67	30.10	.....	46.0	.....	78	30	59	25	26	33	44	40	32	63	.53	−1.2	7	.....	nw.	.....	.....	.....	7	3	21	7.0	.2	.0	0
Portland, Oreg. [2]	154	68	106	29.93	30.10	+.08	47.9	+1.0	77	30	56	33	24	40	32	43	38	77	1.81	−2.1	17	5.6	nw.	22	e.	27	1	9	21	7.8	.0	.0	0
Roseburg	510	45	76	29.56	30.12	+.08	47.2	+.1	77	30	58	29	24	37	38	42	36	71	1.05	−2.2	16	3.8	nw.	21	n.	18	1	12	18	7.7	T	.0	0
Middle Pacific Coast Region							52.0	−1.5										64	2.39	−1.5										5.0			
Eureka	60	72	88	30.06	30.13	+.07	48.4	+.1	68	7	55	35	14	42	26	45	42	78	1.77	−3.5	8	8.3	n.	31	n.	18	10	8	13	6.0	T	.0	0
Redding [1]	722	20	34	29.28	30.06	.....	53.0	−1.0	75	30	63	32	14	43	29	43	30	45	1.87	−2.8	5	8.2	nw.	22	sw.	13	10	6	15	5.8	T	.0	2
Sacramento [2]	66	92	115	29.97	30.04	+.01	53.6	−.7	76	30	64	32	14	43	30	46	40	65	3.31	+.7	5	7.6	n.	31	se.	14	17	8	6	3.9	2.0	.0	0
San Francisco	155	112	132	29.87	30.04	−.02	55.2	+1.0	73	30	62	38	14	49	23	48	42	66	2.62	−.5	5	7.8	w.	34	se.	14	14	8	9	4.5	.0	.0	0
South Pacific Coast Region							56.6	+0.6										61	1.42	−0.6										3.8			
Fresno [1]	327	5	35	29.68	30.04	+.03	54.4	.0	84	30	68	34	26	41	41	47	39	63	1.09	−.5	4	5.8	nw.	30	nw.	31	16	8	7	4.3	.0	.0	1
Los Angeles	338	223	250	29.64	30.00	−.02	58.8	+1.3	80	29	69	40	15	49	30	48	39	54	1.26	−1.5	2	7.3	w.	32	w.	13	17	9	5	3.4	.0	.0	0
San Diego [1]	87	20	55	29.92	30.01	−.01	57.9	.....	76	27	68	44	26	48	30	50	44	65	1.91	+.2	4	6.8	w.	34	sw.	14	17	7	7	3.9	.0	.0	0
West Indies																																
San Juan, P. R.	82	10	54	29.88	29.97	.....	77.8	+2.4	89	19	83	69	12	72	17	...	.....	...	1.44	−1.7	7	10.5	e.	28	e.	8	7	23	1	48	.0	.0	0
Panama Canal																																
Balboa Heights	118	6	92	.....	[3] 29.80	−.04	82.9	+1.7	95	17	91	71	4	74	21	...	.....	[3] 79	1.92	+1.2	10	8.0	nw.	26	n.	6	3	23	5	5.7	.0	.0	0
Cristobal	36	6	97	.....	[3] 29.83	−.05	82.4	+.9	87	13	86	76	12	79	11	77	75	[3] 80	3.30	+1.8	15	11.8	n.	23	n.	10	1	12	18	7.7	.0	.0	0
Alaska																																
Fairbanks	484	11	87	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Juneau	80	96	116	.....	[4] 29.78	.....	34.8	.....	57	31	40	15	23	30	.....	.....	.....	.....	7.92	+2.4	21	8.4	s.	30	e.	3	4	2	25	.....	5.4	.0	0
Nome	22	25	51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hawaiian Islands																																
Honolulu	38	86	100	30.00	30.04	.....	70.0	−1.4	77	20	74	59	9	66	12	63	59	72	1.57	−1.6	17	12.8	ne.	36	ne.	9	8	13	10	5.7	.0	.0	0

LATE REPORTS FOR FEBRUARY 1942

Alaska																																
Anchorage	135	36	47	[4] 29.54	[4] 29.69	.....	30.0	+11.0	47	12	35	17	26	25	15	29	27	86	0.79	+0.1	8	5.0	n.	25	se.	12	1	4	23	8.5	8.9	4.6	...
Barrow	25	4	27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bethel	22	5	32	[4] 29.47	[4] 29.51	.....	21.3	+12.0	42	13	27	1	9	16	33	21	17	79	1.18	+.5	15	.....	ne.	.....	.....	.....	2	1	25	8.8	7.1	.9	...
Ketchiken	75	69	85	[4] 29.96	[4] 29.99	.....	38.8	+3.9	50	8	44	21	24	34	18	37	33	79	5.72	−5.3	16	5.8	se.	33	s.	27	5	3	20	7.6	1.6	.0	...
Nome	43	25	51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

LATE REPORT FOR MARCH 1942

Shreveport	805	111	119	29.68	29.94	.....	57.2	.....	85	13	68	32	3	46	35	49	43	67	3.02	−1.1	9	12.3	s.	36	nw.	2	14	4	13	5.3	T	.0	3

[1] Data are airport records.
[2] Barometric data (adjusted to old city elevation) and hygrometric data from airport; otherwise city office records.
[3] Observations taken bihourly.
[4] Pressure not reduced to a mean of 24 hours.
[5] Barometric data from airport records; other data from city office records.
[6] Wind, clear, partly cloudy, and cloudy data from city office records; other data from airport.

NOTE.—Except as indicated by notes 1, 2, 5, and 6, data in table are city office records.

SEVERE LOCAL STORMS, MARCH 1942

[The table herewith contains such data as has been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Great Valley and Mountain Counties, Va.	2-3			2	$90,000	Blizzard	Snow depths ranged from 6 to 30 inches. Traffic disrupted for several days throughout most of the mountain counties. Schools closed in many places and at Meadows of Dan children were marooned in schools for 2 days. Cost of clearing highways approximately $90,000.
Buffalo, N. Y.	3				50,000	Wind	Property damaged.
Richmond, Va., and vicinity	9	10 a. m.-6 p. m.			1,000	High winds	Signboards wrecked; trees uprooted or broken; telegraph and electric lines damaged; 2 persons injured.
Camden, S. C.	15	11:30 a. m.	880		3,500	Thunderstorm and hail.	Roofs and communication lines damaged; many trees uprooted; path 2½ miles long. Damage from hail, $1,000 given in the estimate above.
El Rena, Okla., and vicinity	15	8:20-8:50 p.m.			200,000	Hail	Much property damaged. Gardens and crops not far enough advanced to be materially affected.
Britton, Okla.	15	8:45-9:20 p.m.	[1]6		3,000	do	About 50 percent of the stones were as large as golf balls or slightly larger and many remained on the ground the following morning. Considerable damage to greenhouses and other property, principally windows and roofs of dwellings. Little or no crop loss; path 12 miles long.
Canadian and Kingfisher Counties, Okla.	15		300-1,760	0	30,300	Tornado	Storm struck in the western portion of Okarche, in the extreme northern portion of Canadian County at 11:10 p. m., and moved in a northeasterly direction for about 12 miles, finally disappearing a few miles east of Kingfisher. Property damaged, 1 person injured, and chickens and farm animals killed.
Sylvania, Leitchfield, Stephensburgh, and Bardstown, Ky., and vicinities.	16	5:40-7:20 p.m.		24	312,000	do	Property damaged.
Shelbyville, Mays, and Lewisville, Ind.	16	6 p. m.	400	0	300,000	do	Most of the damage occurred at Shelbyville, where 7 persons were injured. Some damage at Mays and Lewisville.
Goshen and Plymouth, Ind.	16	9:30 p. m.	167	2	400,000	do	Most of the damage at Goshen where 32 persons were injured and 87 houses damaged. Some damage at Plymouth.
West Union, Ind., vicinity of	16	10 p. m.	17	0	1,000	do	Path from southwest to northeast; no details.
Champaign, Vermillion, Fulton, Knox, Marshall, and Logan Counties, Ill.	16			20	859,000	do	115 residences and 86 barns destroyed; many others damaged with more tha 120 persons injured. About 85 percent of all losses occurred to town property at Alvin, in Vermillion County, and Lacon, in Marshall County.
Leflore, Carroll, Granada, Yalobusha, Calhoun, Lafayette, Pontotoc, Union, Lee, Prentis, Marshall, and Benton, Counties, Miss.	16			65		do	Property damage not estimated. Power and electric lines crippled; some livestock killed. Greatest loss to residence, farm buildings, and equipment. 500 persons were injured.
New York State, western counties.	16-17				1,000,000	Heavy rains	Many streams overflowed, inundating roads, bridges, and farms. In Chautauqua County, many cattle drowned and schools and manufacturing plants were forced to close. In Mayville a train was derailed.
Norway, S. C., vicinity of	17	6:30 p. m.	440	0	25,000	Tornado	There were 13 homes, 1 school, and a number of outbuildings demolished. 7 persons injured by falling debris.
Brookings, Moody, Minnehaha, and Lincoln Counties, S. Dak.	19-20	2:39 p. m.-5:13 a. m.	80		50,000	Clinging, wet snow	Especially severe in Minnehaha County. Damage to communication lines and trees.
South Dakota, eastern half	25-27				100,000	High wind and wet snow.	Communication lines disrupted; traffic halted and highways blocked, and schools closed for several days.

[1] Miles instead of yards.

SOLAR RADIATION AND SUNSPOT DATA FOR MARCH 1942

[Solar Radiation Investigations Section, I. F. HAND in charge]

SOLAR RADIATION OBSERVATIONS

Explanations of the tables, and references to descriptions of instruments, stations and methods of observation, and to summaries of data, are given in the January 1942 REVIEW, p. 20.

TABLE 1.—*Solar radiation intensities during March 1942*

[Gram-calories per minute per square centimeter of normal surface]

MADISON, WIS.

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.					P. M.				Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Mar. 3	2.87	.....	0.96	1.06	1.26	1.60	1.33	.....	.....	.....	2.87
Mar. 9	2.36	.....	.....	.....	1.35	1.56	.....	.....	.....	.....	3.00
Mar. 10	2.74	.....	.98	1.10	1.24	.....	.....	.....	.....	.....	2.74
Mar. 12	3.15	.....	1.02	1.14	1.25	1.41	.....	.....	.....	.....	3.15
Mar. 19	3.63	0.87	.96	1.11	1.28	1.55	.....	.....	.....	.....	4.37
Mar. 23	3.00	.....	.....	.....	.....	.....	1.24	.....	.....	.....	3.00
Mar. 31	3.99	.....	.....	.54	.74	1.28	.....	.....	.....	.....	3.63
Means	.....	(.87)	.98	.99	1.19	1.48	(1.28)	.....	.....	.....	.....
Departures	.....	−.01	−.02	−.15	−.11	−.08	−.02	.....	.....	.....	.....

TABLE 1.—*Solar radiation intensities during March 1942*—Continued

[Gram-calories per minute per square centimeter of normal surface]

LINCOLN, NEBR.

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.					P. M.				Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Mar. 2	2.62	1.04	1.13	1.24	1.38	.....	1.41	1.27	1.16	1.09	3.45
Mar. 4	4.57	.....	.....	.....	.....	.....	1.38	1.22	1.12	1.01	4.57
Mar. 5	3.81	.94	1.05	.....	.....	.....	.....	.....	.....	.....	4.75
Mar. 8	3.45	.....	1.05	1.20	1.36	.....	.....	.....	.....	.....	3.63
Mar. 9	3.30	.96	1.05	1.16	1.31	.....	.....	.....	.....	.....	4.75
Mar. 11	3.00	.....	.....	.....	.....	.....	1.29	1.14	1.03	.94	4.17
Mar. 21	3.45	1.01	1.09	1.20	1.38	.....	1.27	1.14	1.03	.92	3.63
Mar. 22	3.63	.....	.....	.....	.....	.....	1.25	1.06	.92	.84	6.15
Mar. 23	3.57	.62	.83	.97	1.16	.....	.....	.....	.....	.....	7.04
Means	.....	.91	1.03	1.15	1.32	.....	1.32	1.17	1.05	.96	.....
Departures	.....	+.06	+.09	+.05	+.04	.....	+.04	+.08	+.11	+.14	.....

TABLE 1.—*Solar radiation intensities during March 1942*—Continued

[Gram-calories per minute per square centimeter of normal surface]

ALBUQUERQUE, N. MEX.

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.				P. M.					Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Mar. 1	3.15				1.34	1.57	1.39	1.26	1.14	1.05	3.63
Mar. 2	2.74	1.06	1.17	1.31	1.45	1.58	1.44		1.20	1.09	2.87
Mar. 4	4.37					1.62	1.42	1.29	1.18	1.02	2.87
Mar. 5	1.96	1.01	1.11	1.25	1.39	1.59	1.39	1.25	1.10	1.00	2.26
Mar. 8	1.96				1.40	1.65	1.42	1.28	1.14	1.03	2.49
Mar. 9	2.74				1.41	1.66	1.42				2.87
Mar. 10	3.00	1.00	1.22	1.22	1.40						2.87
Mar. 13	3.63	1.02	1.10		1.42						3.30
Mar. 14	3.30	1.02	1.12	1.25	1.41			1.23			2.62
Mar. 15	4.37			1.24							3.00
Mar. 17	2.74	1.01	1.14			1.64	1.38	1.20	1.09	.97	2.87
Mar. 18	2.36	1.04	1.11	1.25							3.15
Mar. 19	2.74	1.00	1.11	1.24	1.39						3.30
Mar. 20	2.49	.99	1.08	1.19		1.61	1.37	1.25	1.12	1.03	2.06
Mar. 21	2.06	1.02	1.13	1.26	1.41	1.67	1.37	1.24	1.14	1.03	1 88
Mar. 22	1.52	1.00	1.11	1.28	1.40	1.57	1.36	1.20	1.09	1.00	2.36
Mar. 26	3.00	1.00	1.11	1.24	1.39	1.61					2.36
Mar. 27	2.06	1.05	1.13	1.26	1.42	1.58	1.40	1.23	1.14	1.04	2.26
Mar. 28	1.52	1.01	1.11	1.23	1.40						1.96
Mar. 29	1.70	1.04	1.16	1.26	1.39	1.58	1.39	1.22	1.11	1.04	2.06
Means		1.02	1.12	1.25	1.40	1.61	1.40	1.24	1.13	1.03	
Departures											

BLUE HILL, MASS.

Mar. 1	2.8									0.84	2.6
Mar. 4	4.0							1.09	.95	.87	3.3
Mar. 7	2.8	.91	.98	1.09	1.23				.73	.61	3.0
Mar. 8	5.0	.74	.83						.87	.78	5.8
Mar. 11	2.5	.88	1.00	1.13	1.31		1.22		.73	.56	2.2
Mar. 12	6.1							.98		.76	5.0
Mar. 13	2.9	.92	.98	1.11	1.29	1.38	1.24	1.08		.81	2.0

TABLE 1.—*Solar radiation intensities during March 1942*—Continued

[Gram-calories per minute per square centimeter of normal surface]

BLUE HILL, MASS.—Continued

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.				P. M.					Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Mar. 20	2.3	.88	1.00	1.12	1.25	1.38	1.20	1.06	.92	.82	2.3
Mar. 24	2.9	.75	.85	.96	1.12						2.9
Mar. 25	2.9	.82	.95	1.06	1.21						2.8
Mar. 27	3.3						1.16	1.02	.87	.78	3.5
Mar. 28	3.0		1.01				1.35				3.2
Mar. 31	3.8			.98	1.16						4.4
Means		.84	.95	1.07	1.22	(1.38)	1.23	1.05	.85	.76	
Departures		—.05	—.03	—.03	—.02	—.05	—.01	—.02	—.11	—.10	

Late Data—**ALBUQUERQUE, N. MEX.**

Feb. 2	2.36						1.41				2.87
Feb. 3	2.26				1.37						2.74
Feb. 4	2.36	1.12	1.19	1.32	1.44		1.46	1.34	1.22	1.16	3.00
Feb. 8	2.49				1.44		1.48	1.33	1.23	1.10	2.87
Feb. 9	2.26	1.10	1.19	1.30	1.42		1.38				2.62
Feb. 11	2.06						1.45	1.31	1.19	1.09	3.15
Feb. 12	3.00	.99	1.14	1.25	1.40			1.26	1.16	1.05	3.15
Feb. 13	2.36				1.32						2.36
Feb. 14	2.87	.97	1.09	1.20	1.32						2.87
Feb. 15	2.74									1.09	3.00
Feb. 17	1.69	1.07	1.16								2.87
Feb. 18	.81	1.08	1.18	1.26	1.41		1.30	1.14	1.09	1.04	1.52
Feb. 19	.91				1.39		1.44	1.28	1.18	1.07	1.32
Feb. 21	1.32						1.44				2.06
Feb. 23	2.26	1.08	1.16		1.46		1.43	1.28	1.15		2.87
Feb. 26	1.96	1.08	1.18	1.28							2.36
Means		1.06	1.16	1.27	1.40		1.42	1.28	1.17	1.09	
Departures											

*Extrapolated.

TABLE 2.—*Daily totals and weekly means of solar radiation (direct and diffuse) received on a horizontal surface*

[Gram-calories per square centimeter]

Date	Washington	Madison	Lincoln	Chicago	New York	Fresno	Fairbanks	Cambridge	Nashville	Twin Falls	La Jolla	New Orleans	Riverside	Blue Hill	Friday Harbor	Ithaca	Newport	State College
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Feb. 26	390	105	324	30	432	271		362	131	413		86	248	348	148	206	389	301
Feb. 27	281	302	419	68	376	426		370	228	282		386	415	368	136	190	423	168
Feb. 28	321	270	296	55	217	433		126	404	344		467	503	155	61	97	143	105
Mar. 1	204	359	285	161	192	448		303	385	437		54	474	332	127	138	231	169
Mar. 2	117	127	434	16	182	309		303	35	334		180	410	328	243	224	330	142
Mar. 3	116	410	386	322	73	302		96	303	462		568	449	87	208	49	80	163
Mar. 4	450	173	289	253	420	443		288	274	432		118	488	323	79	317	354	443
Mean	268	249	347	129	270	376	132	264	251	386		266	427	277	143	174	278	213
Mar. 5	211	233	419	342	174	374		283	197	312		92	470	295	363	237	295	365
Mar. 6	345	187	219	217	140	469		33	444	381	297	561	322	14	235	238	51	348
Mar. 7	454	140	132	138	371	470		387	255	475	508	256	521	408	261	359	411	397
Mar. 8	324	90	377	48	392	468		364	119	412	498	232	490	360	66	412	403	254
Mar. 9	275	393	390	414	173	423		108	398	380	464	584	484	80	169	193	126	164
Mar. 10	514	305	368	392	308	132		347	421	371	221	563	208	324	310	322	219	421
Mar. 11	363	107	432	132	342	420		444	88	182	462	349	313	466	225	276	445	233
Mean	355	208	334	240	271	394	125	281	274	359	408	377	401	278	233	291	279	326
Mar. 12	526	416	94	343	236	489		117	421	178	299	243	299	122	215	64	146	114
Mar. 13	420	168	55	165	324	273		474	56	244	467	262	473	479	148	440	479	212
Mar. 14	237	370	12	371	40	112		63	183		131	300	131	50	370	58	38	57
Mar. 15	251	43	57	106	236	327		127	184		484	114	529	139	127	46	108	193
Mar. 16	80	76	23	64	216	495		372	309	187	526	300	537	375	227	135	372	13
Mar. 17	237	100	268	59	55	512		68	524	387		442	538	114	333	216	118	284
Mar. 18	129	338	463	55	345	450		305	440	420		624	504	288	262	96	288	102
Mean	269	216	139	166	207	380	183	218	302	283	382	326	430	224	240	151	222	139
Mar. 19	433	461	206	478	483	516		312	455	463	528	454	581	327	270	205	414	358
Mar. 20	340	114	227	314	530	536		516	280	519	567	129	574	518	410	493	524	467
Mar. 21	38	272	518	88	131	543		327	298	519	567	131	569	356	220	141		145
Mar. 22	387	532	500	536	380	539		344	534	429	559	607	548	292	334	240	359	269
Mar. 23	213	508	468	436	264	431		323	525	393	493	596	562	350	299	130	340	222
Mar. 24	540	350	312	403	519	468		364	503	433	405	600	401	374	348	250	422	530
Mar. 25	481	305	95	322	553	563		444	454	413	500	334	566	443	347	457	424	580
Mean	348	363	332	368	408	514	261	376	436	453	517	407	543	380	318	274	414	367
Mar. 26	467	24	189	50	569	577		310	80	563	572		596	293	454	563	299	561
Mar. 27	494	137	487	97	468	508		447	75	538	595		594	509	414	523	506	535
Mar. 28	57	190	235	202	296	570		524	567	544	505	678	533	479	115	168	463	58
Mar. 29	167	143	221	160	157	542		498	546	550	582	614	560	496	461	190	451	141
Mar. 30	487	317	236	63	314	566		177	394	553	494	597	540	127	370	188	171	458
Mar. 31	486	381	498	115	70	451		407	333	442	469	610	552	455	302	78	188	299
Apr. 1	438	490	526	542	360	545		353	435	572	228	636	577	332	516	322	368	358
Mean	371	240	342	175	319	537	294	388	347	538	492	627	565	384	376	290	349	344

TABLE 2.—*Daily totals and weekly means of solar radiation (direct and diffuse) received on a horizontal surface*—Continued

[Gram-calories per square centimeter]

DEPARTURES FROM WEEKLY NORMALS

Date	Washington	Madison	Lincoln	Chicago	New York	Fresno	Fairbanks	Cambridge	Nashville	Twin Falls	La Jolla	New Orleans	Riverside	Blue Hill	Friday Harbor	Ithaca	Newport	State College
	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
	−12	−20	+36	−82	+3	+19	−7	+5	.....	+108	.....	−5	+63	−21	−22	−56	−2	−36
	+43	−90	+10	+15	−5	−1	−28	+7	.....	+11	−4	+48	−7	−14	+12	+39	−19	+66
	−49	−103	−214	−75	−77	−25	−16	−96	.....	−48	−24	−20	+29	−80	+25	−62	−117	−143
	+4	+34	−46	+95	+60	+65	+45	+15	.....	+54	+68	+47	+155	−12	+30	−32	+24	+36
	+23	−112	−29	−83	−12	+75	+9	+1	.....	+174	+6	+269	+173	−2	+54	+8	−51	−33
	+63	−2037	−1701	−910	−217	+931	+21	−476	.....	+2093	+322	+2373	+2891	−903	+693	−721	−1155	−770
ACCUMULATED DEPARTURES ON—																		
	+1820	−2926	−3031	−742	+882	+1687	−854	−490	.....	+2380	.....	+4585	+3822	−1043	+2184	−210	−987	.....

LATE REPORT
FEBRUARY 1942 VAPOR PRESSURES AT MADISON, WIS.

	1:30 a. m.	7:30 a. m.	1:30 p. m.	7:30 p. m.
Feb. 2	0.047	0.040	0.054	0.052
Feb. 12	.098	.044	.093	.070
Feb. 13	.044	.034	.010	.085
Feb. 17	.042	.017	.028	.026
Feb. 20	.026	.025	.054	.054
Mean	.089	.084	.101	.100

POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR MARCH 1942

[Communicated by Capt. J. F. Hellweg, U. S. Navy (Ret.), Superintendent, U. S. Naval Observatory.] All measurements and spot counts were made at the Naval Observatory from plates taken at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive toward the north. Areas are corrected for foreshortening and expressed in millionths of sun's hemisphere. For each day, under longitude, latitude, area of spot or group, and spot count are included assumed longitude of center of the disk, assumed latitude of center of the disk, total area of spots and groups, and total spot count.

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1942	h m		°	°	°	°				
Mar. 1	11 43	7381	−25	160	+8	29	48	2	F	Mt. Wilson.
		7380	+1	186	−12	5	24	1		
		7378	+12	197	+9	20	1,745	30		
		7379	+21	206	−10	21	242	8		
		7383	+53	238	+11	55	48	2		
		7382	+62	247	−15	62	145	5		
		7377	+70	255	+6	70	194	10		
				(185)	(−7)		2,446	58		
Mar. 2	10 47	7381	−11	161	+8	19	24	3	VG	Do.
		7380	+15	187	−12	15	12	2		
		7378	+25	197	+9	30	1,309	40		
		7379	+33	205	−11	33	194	29		
		7383	+66	238	+11	68	73	15		
		7382	+77	249	−14	77	145	6		
		7377	+81	253	+7	81	194	11		
				(172)	(−7)		1,951	106		
Mar. 3	11 13	7378	+39	198	+9	42	1,067	9	P	Do.
		7379	+49	208	−10	49	97	2		
				(159)	(−7)		1,164	11		
Mar. 4	10 48	7378	+53	199	+9	55	1,067	15	VG	Do.
		7379	+64	210	−10	64	97	6		
				(146)	(−7)		1,164	21		
Mar. 5	10 43	7381	+28	161	+9	33	24	1	VG	Do.
		7378	+66	199	+8	68	1,018	14		
		7379	+77	210	−10	77	97	2		
				(133)	(−7)		1,139	17		
Mar. 6	10 38	7381	+43	163	+8	46	48	7	G	U. S. Naval.
		7378	+79	199	+8	79	970	4		
				(120)	(−7)		1,018	11		

POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR MARCH 1942—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1942	h m		°	°	°	°				
Mar. 7	10 37	7381	+57	164	+8	59	24	1	G	U. S. Naval.
		(*)	+68	175	−3	68	12	2		
				(107)	(−7)		36	3		
Mar. 8	10 45	7381	+71	164	+8	72	12	1	G	Mt. Wilson.
				(93)	(−7)		12	1		
Mar. 9	11 32	.....	.....	No spots	.....	.....	.....	.....	G	U. S. Naval
Mar. 10	11 16	7385	−84	343	−13	84	48	1	F	Do.
				(67)	(−7)		48	1		
Mar. 11	11 6	7386	−72	342	+13	73	48	1	F	Do.
		7385	−69	345	−13	70	48	1		
				(54)	(−7)		96	2		
Mar. 12	10 27	7386	−59	342	+13	62	24	1	F	Do.
				(41)	(−7)		24	1		
Mar. 13	13 11	7386	−45	341	+13	50	24	2	G	Do.
		7387	−25	1	+4	28	97	13		
				(26)	(−7)		121	15		
Mar. 14	15 16	7386	−31	341	+11	37	12	1	F	Do.
		7387	−11	1	+3	17	97	12		
				(12)	(−7)		109	13		
Mar. 16	10 54	7388	−69	279	+8	70	485	1	G	Mt. Wilson.
		7387	+13	1	+3	18	48	9		
		7387	+20	8	+3	23	97	11		
				(348)	(−7)		630	21		
Mar. 17	13 23	7389	−79	254	−12	80	97	1	G	U. S. Naval.
		7390	−69	264	−8	69	12	1		
		7388	−52	281	+10	55	339	1		
		7387	+34	7	+3	37	194	9		
				(333)	(−7)		642	12		
Mar. 18	11 1	7392	−73	248	+11	74	145	2	F	Mt. Wilson.
		7389	−65	256	−13	65	145	3		
		7391	−61	260	+7	64	97	1		
		7388	−39	282	+9	42	388	2		
		7387	+46	7	+2	48	194	10		
				(321)	(−7)		969	18		
Mar. 19	11 28	7395	−64	244	−14	65	48	6	F	U. S. Naval.
		7392	−60	248	+10	62	145	1		
		7391	−50	258	+7	53	48	10		
		7389	−50	258	−12	50	194	12		
		7394	−47	261	−10	47	24	4		
		7393	−36	272	+8	40	12	3		
		7388	−27	281	+9	31	339	1		
		7387	+60	8	+3	61	170	19		
				(308)	(−7)		980	57		

POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR MARCH 1942—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1942	h m		°	°	°	°				
Mar. 20	11 53	7395	−50	245	−14	50	121	5	F	U. S. Naval.
		7392	−48	247	+9	51	145	4		
		7391	−38	257	+7	41	97	4		
		7389	−38	257	−11	38	242	19		
		7394	−33	262	−9	33	97	6		
		7393	−22	273	+8	27	12	2		
		7388	−12	283	+10	21	291	2		
		7387	+74	9	+3	75	97	3		
				(295)	(−7)		1,102	45		
Mar. 21	11 50	7397	−82	199	+7	82	582	2	F	Mt. Wilson.
		7395	−36	245	−15	37	121	2		
		7392	−36	245	+10	40	145	6		
		7391	−25	256	+7	30	242	13		
		7389	−24	257	−12	25	242	12		
		7394	−19	262	−9	19	291	10		
		7388	+2	283	+9	16	339	2		
		7396	+38	319	+13	43	48	3		
				(281)	(−7)		2,010	50		
Mar. 22	12 4	7397	−70	198	+9	71	1,018	11	G	U. S. Naval.
		7398	−36	232	−9	36	12	4		
		7395	−26	242	−15	27	48	7		
		7392	−20	248	+9	26	145	9		
		7395	−19	249	−13	21	48	2		
		7391	−11	257	+7	18	145	15		
		7389	−11	257	−12	12	121	11		
		7394	−5	263	−9	5	194	13		
		7388	+14	282	+9	22	339	2		
		7396	+51	319	+13	56	48	4		
				(268)	(−7)		2,118	78		
Mar. 23	12 46	7397	−55	200	+9	58	1,018	14	VG	Do.
		7395	−10	245	−15	12	12	1		
		7392	−8	247	+9	17	145	13		
		7395	−5	250	−13	7	48	6		
		7391	+3	258	+8	17	145	20		
		7389	+3	258	−12	6	121	15		
		7394	+9	264	−9	9	194	21		
		(*)	+20	275	+4	23	24	4		
		7388	+28	283	+8	33	291	6		
				(255)	(−7)		1,998	100		
Mar. 24	11 36	7399	−77	165	+17	79	194	8	G	Do.
		7397	−42	200	+9	46	921	12		
		(*)	+2	244	−5	2	24	2		
		7392	+5	247	+10	18	194	13		
		7395	+8	250	−13	10	48	3		
		7389	+15	257	−12	15	145	10		
		7391	+17	259	+8	23	73	10		
		7394	+23	265	−10	24	194	20		
		7388	+41	283	+8	44	291	5		
				(242)	(−7)		2,084	83		
Mar. 25	11 40	7399	−65	164	+16	68	24	2	F	U. S. Naval.
		7400	−34	195	+14	40	12	1		
		7397	−29	200	+9	33	776	17		
		7392	+18	247	+10	25	194	7		
		7395	+22	251	−13	22	48	1		
		7389	+29	258	−12	29	97	6		
		7391	+30	259	+7	33	48	6		
		7394	+35	264	−10	35	145	13		
		7388	+54	283	+8	56	242	3		
				(229)	(−7)		1,586	56		
Mar. 26	10 43	7400	−20	196	+13	29	24	1	P	Do.
		7397	−15	201	+8	22	582	9		
		7401	+24	240	−6	25	24	2		
		7392	+31	247	+10	36	194	4		
		7395	+36	252	−13	36	48	1		
		7389	+43	259	−14	43	24	2		
		7394	+48	264	−11	48	97	5		
		7388	+68	284	+8	70	242	1		
				(216)	(−7)		1,235	25		
Mar. 27	11 0	7400	−7	196	+12	21	24	4	VG	Mt. Wilson.
		7397	−3	200	+8	17	582	18		
		(*)	+2	205	−15	8	12	2		

POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR MARCH 1942—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1942	h m		°	°	°	°				
Mar. 27		7392	+43	246	+9	47	48	2		
		7392	+48	251	+9	50	97	5		
		7402	+51	254	−8	51	12	2		
		7395	+53	257	−13	53	24	2		
		7389	+61	264	−12	61	24	2		
		7394	+64	267	−10	64	12	2		
		7388	+80	283	+8	80	242	1		
				(203)	(−7)		1,077	40		
Mar. 28	10 41	7400	+6	196	+12	20	24	4	F	Mt. Wilson.
		7397	+11	201	+8	20	485	20		
		7392	+61	251	+10	63	97	6		
				(190)	(−7)		606	30		
Mar. 29	10 5	7403	−75	102	+10	76	145	1	VG	Do.
		7397	+25	202	+8	30	582	37		
		7392	+73	250	+10	74	97	5		
				(177)	(−7)		824	43		
Mar. 30	11 22	7403	−70	93	+15	72	48	2	G	U. S. Naval.
		7403	−61	102	+11	63	97	1		
		7404	−2	161	−2	6	48	3		
		7397	+36	199	+9	40	485	13		
		7397	+45	208	+9	46	194	18		
				(163)	(−7)		872	37		
Mar. 31	10 56	7403	−56	94	+14	60	24	3	VG	Do.
		7403	−48	102	+11	50	121	8		
		7404	+11	161	−2	12	97	5		
		7397	+49	199	+9	51	436	8		
		7397	+57	207	+9	60	97	8		
				(150)	(−7)		775	32		

Mean daily area for 30 days=961.

(*)=not numbered.
VG=very good; G=good; F=fair; P=poor.

PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR MARCH 1942

[Based on observations at Zurich, or Locarno (bold-face type) as indicated. Data furnished through the courtesy of Prof. W. Brunner, Eidgenössiches Sternwarte, Zurich, Switzerland]

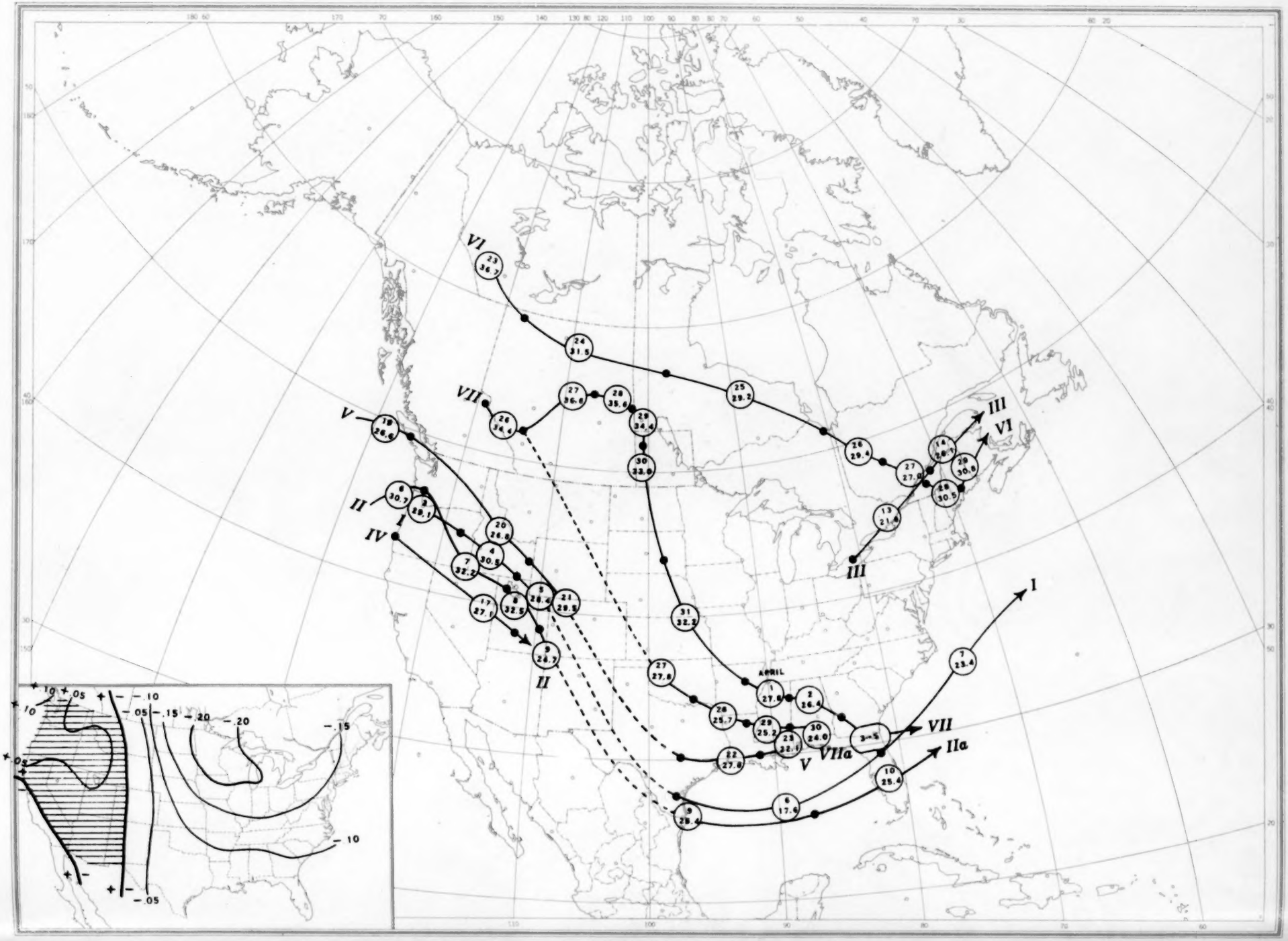
March, 1942	Relative numbers	March 1942	Relative numbers	March 1942	Relative numbers
1	127	11	15	21	*ad* 83
2	116	12	16	22	102
3	57	13	*Ec* 17	23	*aa* 117
4	32	14	26	24	**106**
5		15	*ad* 26	25	100
6	20	16	29	26	115
7	7	17	*d* 38	27	*b* 79
8	0	18	53	28	48
9	0	19	*Ec* 65	29	*d* 37
10	0?	20	72	30	61
				31	56

Mean, 30 days=54.0

a=Passage of an average-sized group through the central meridian.
b=Passage of a large group through the central meridian.
c=New formation of a group developing into a middle-sized or large center of activity: E, on the eastern part of the sun's disk; W, on the western part; M, in the central-circle zone.
d=Entrance of a large or average-sized center of activity on the east limb.

Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, March 1942

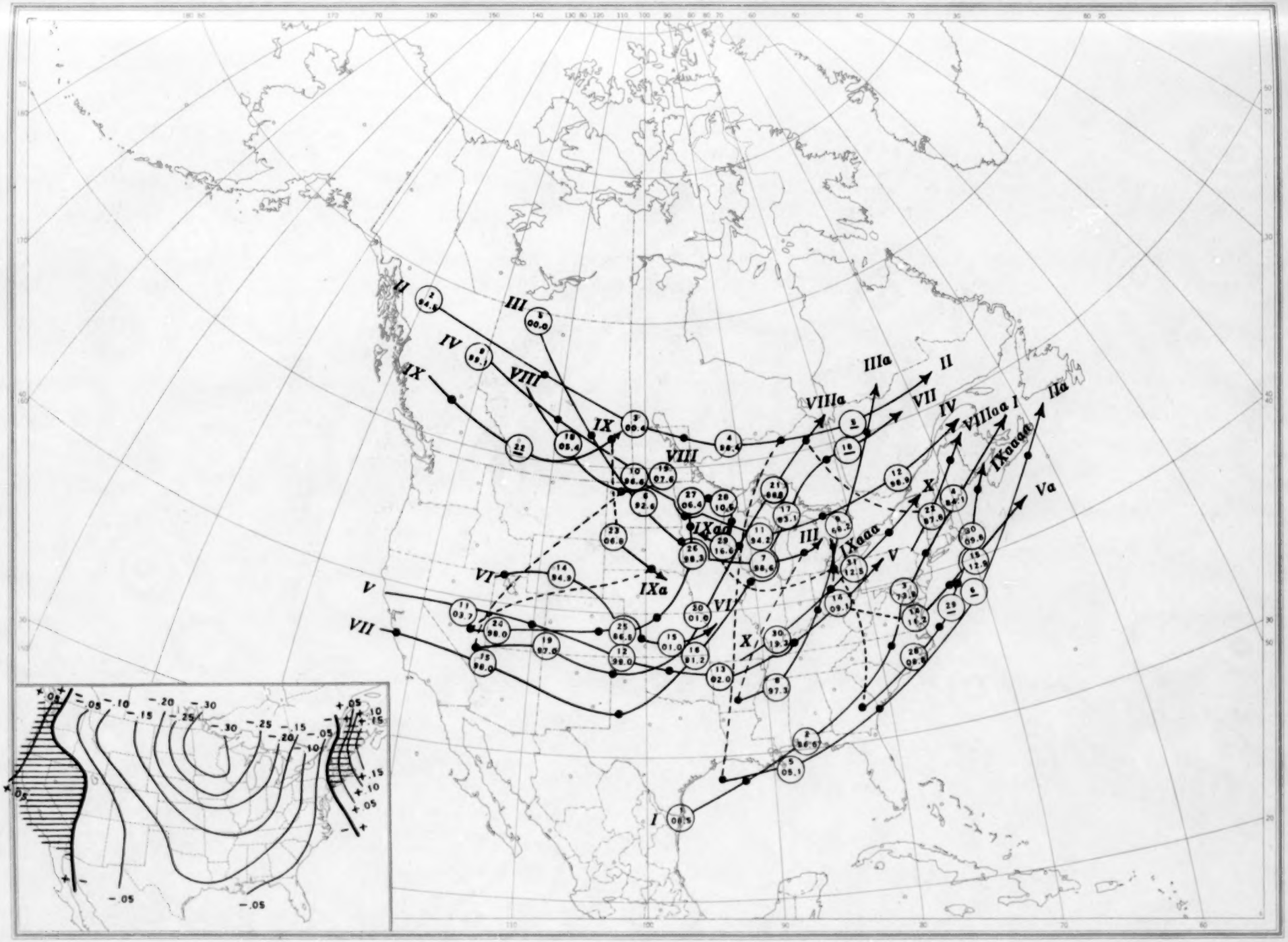
Chart II. Tracks of Centers of Anticyclones, March 1942. (Inset) Departure of Monthly Mean Pressure from Normal



Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time).

Chart III. Tracks of Centers of Cyclones, March 1942. (Inset) Change in Mean Pressure from Preceding Month

Chart III. Tracks of Centers of Cyclones, March 1942. (Inset) Change in Mean Pressure from Preceding Month



Circle indicates position of cyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of cyclone at 7:30 p. m. (75th meridian time).

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, March 1942

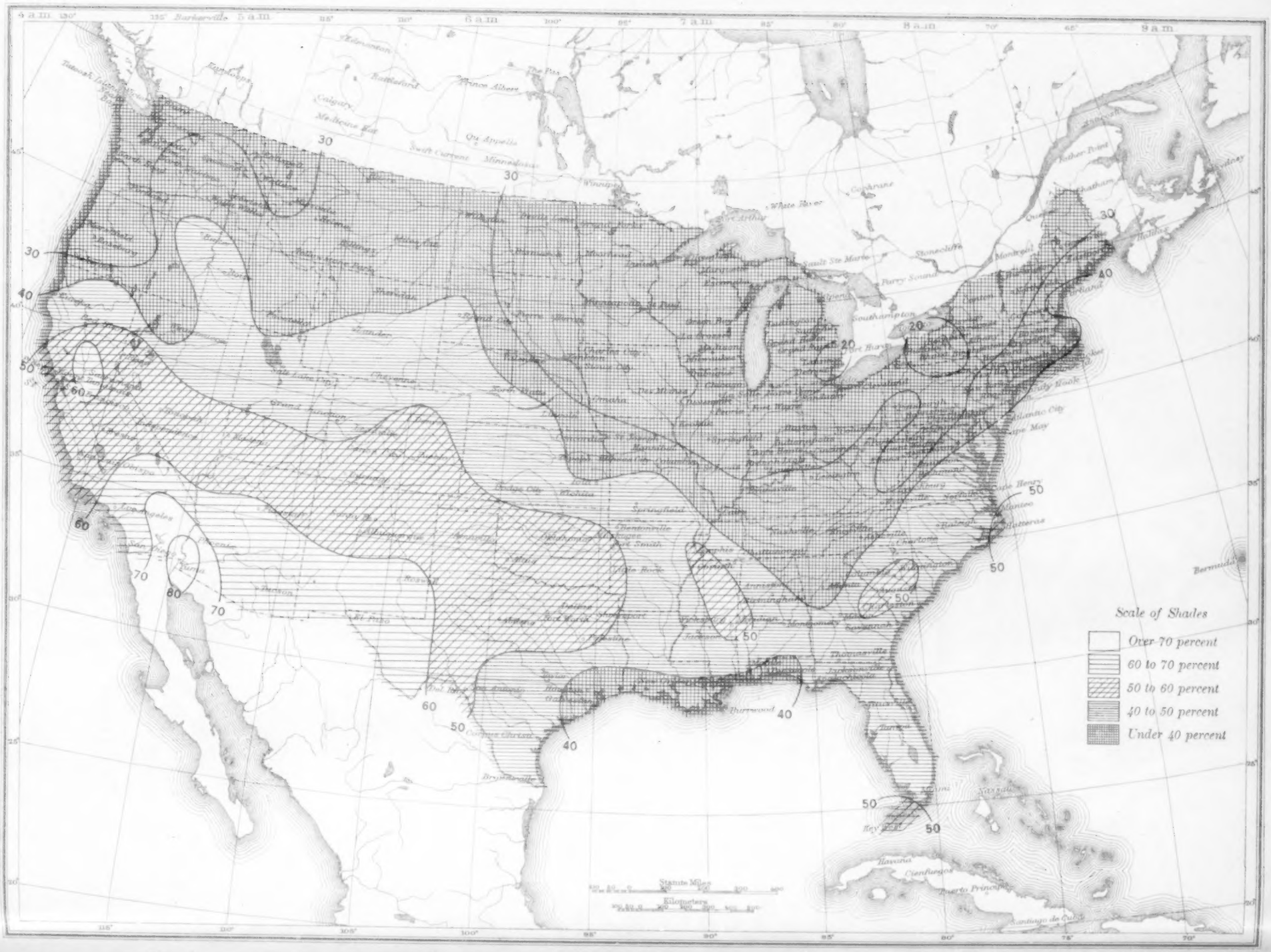


Chart V. Total Precipitation, Inches, March 1942

Chart V. Total Precipitation, Inches, March 1942

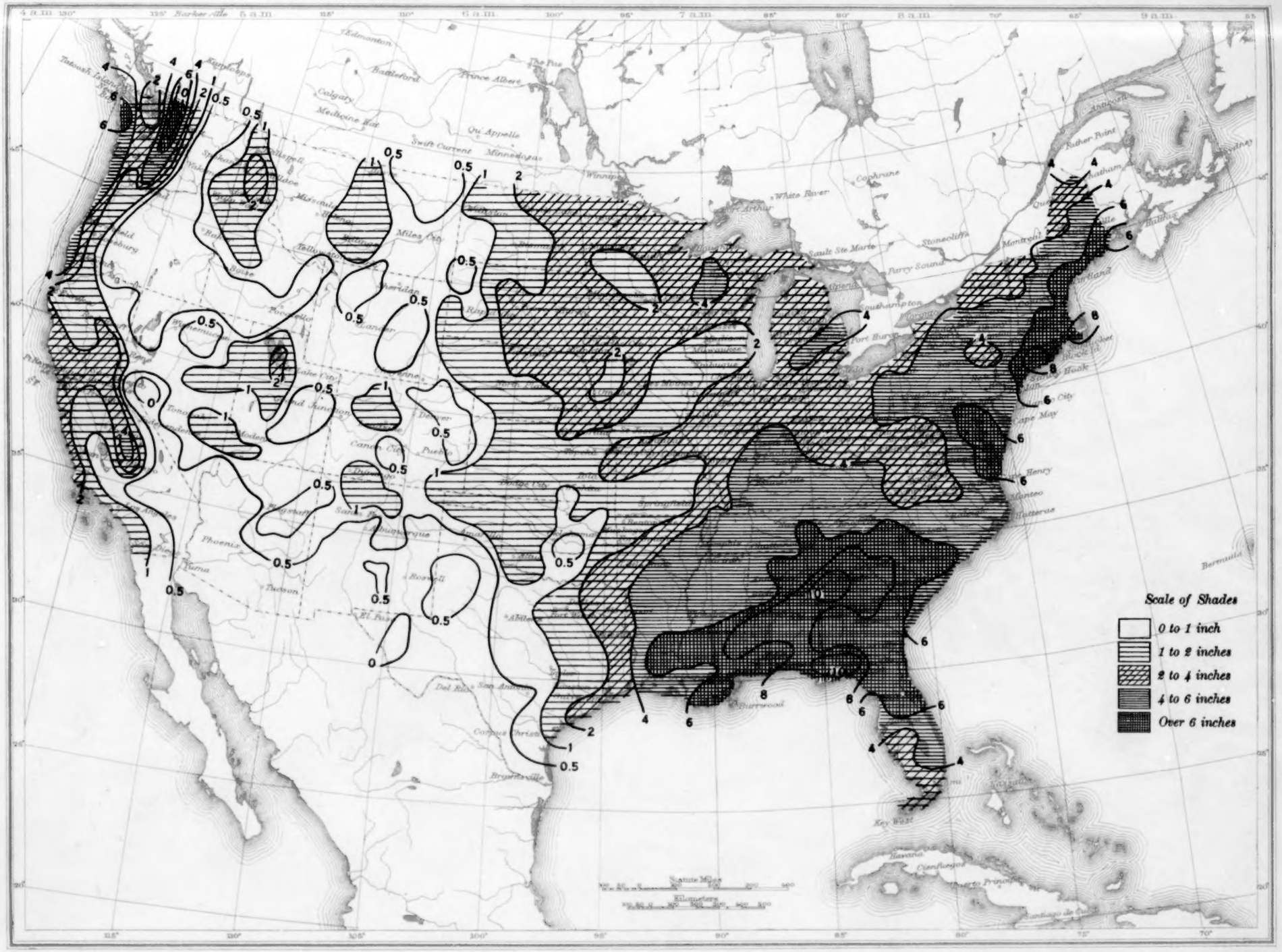


Chart VI. Isobars at Sea Level and Isotherms at Surface; Prevailing Winds, March 1942

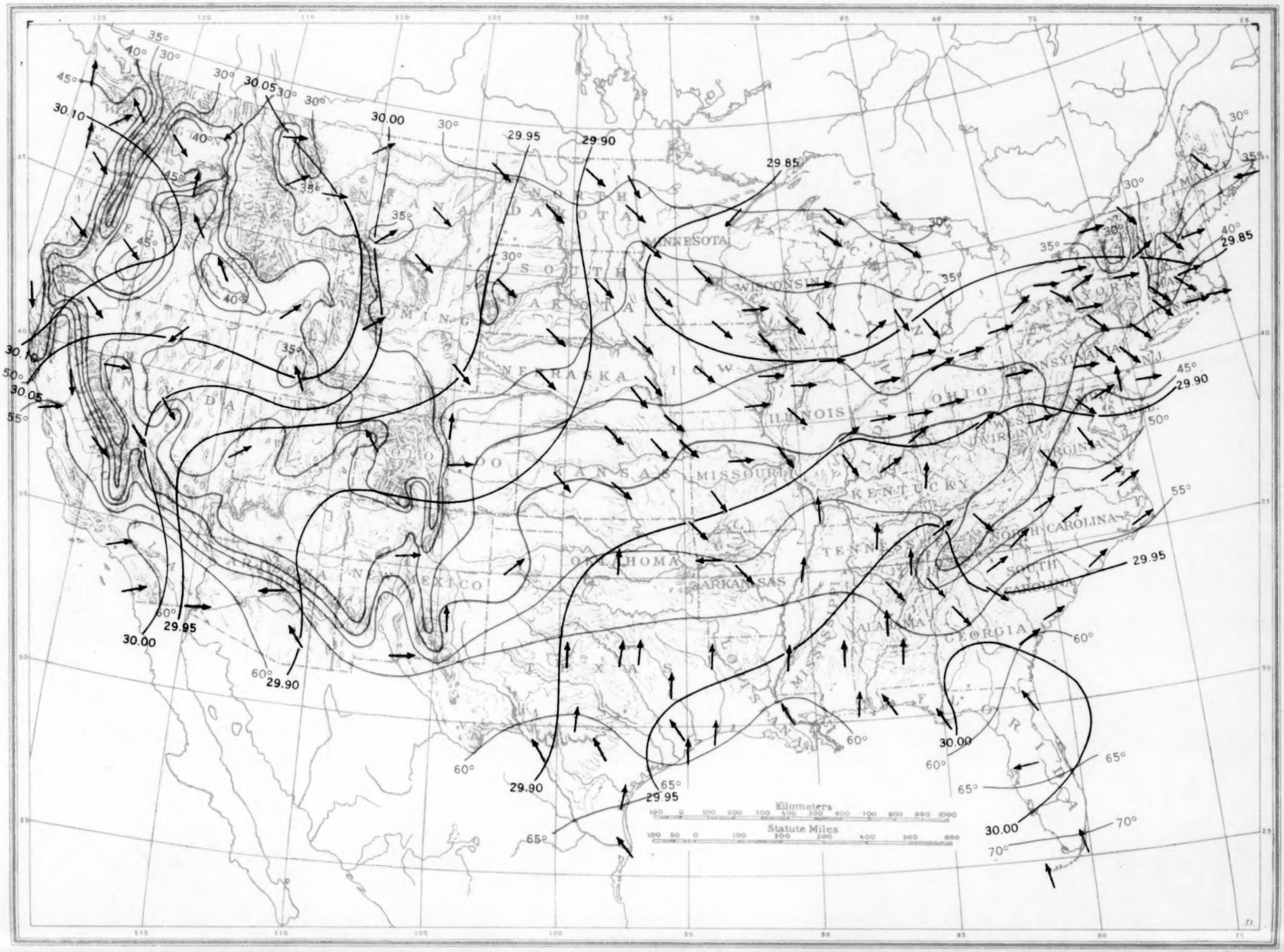


Chart VII. Total Snowfall, Inches, March 1942. (Inset) Depth of Snow on the Ground at 7:30 p.m., Monday, March 30, 1942

Chart VII. Total Snowfall, Inches, March 1942. (Inset) Depth of Snow on the Ground at 7:30 p.m., Monday, March 30, 1942

Chart VIII. **Isobars (mb) for 1,524 Meters (5,000 ft.) and Isotherms (°C.) and Resultant Winds for 1,500 Meters (m. s. l.) March 1942**
Isobars and isotherms based on radiosonde observations at 11:00 p. m. (E. S. T.) and winds based on pilot-balloon observations at 5:00 a. m. (E. S. T.).

Chart VIII. Isobars (mb) for 1,524 Meters (5,000 ft.) and Isotherms (°C.) and Resultant Winds for 1,500 Meters (m. s. l.) March 1942

Isobars and isotherms based on radiosonde observations at 11:00 p. m. (E. S. T.) and winds based on pilot-balloon observations at 5:00 a. m. (E. S. T.).

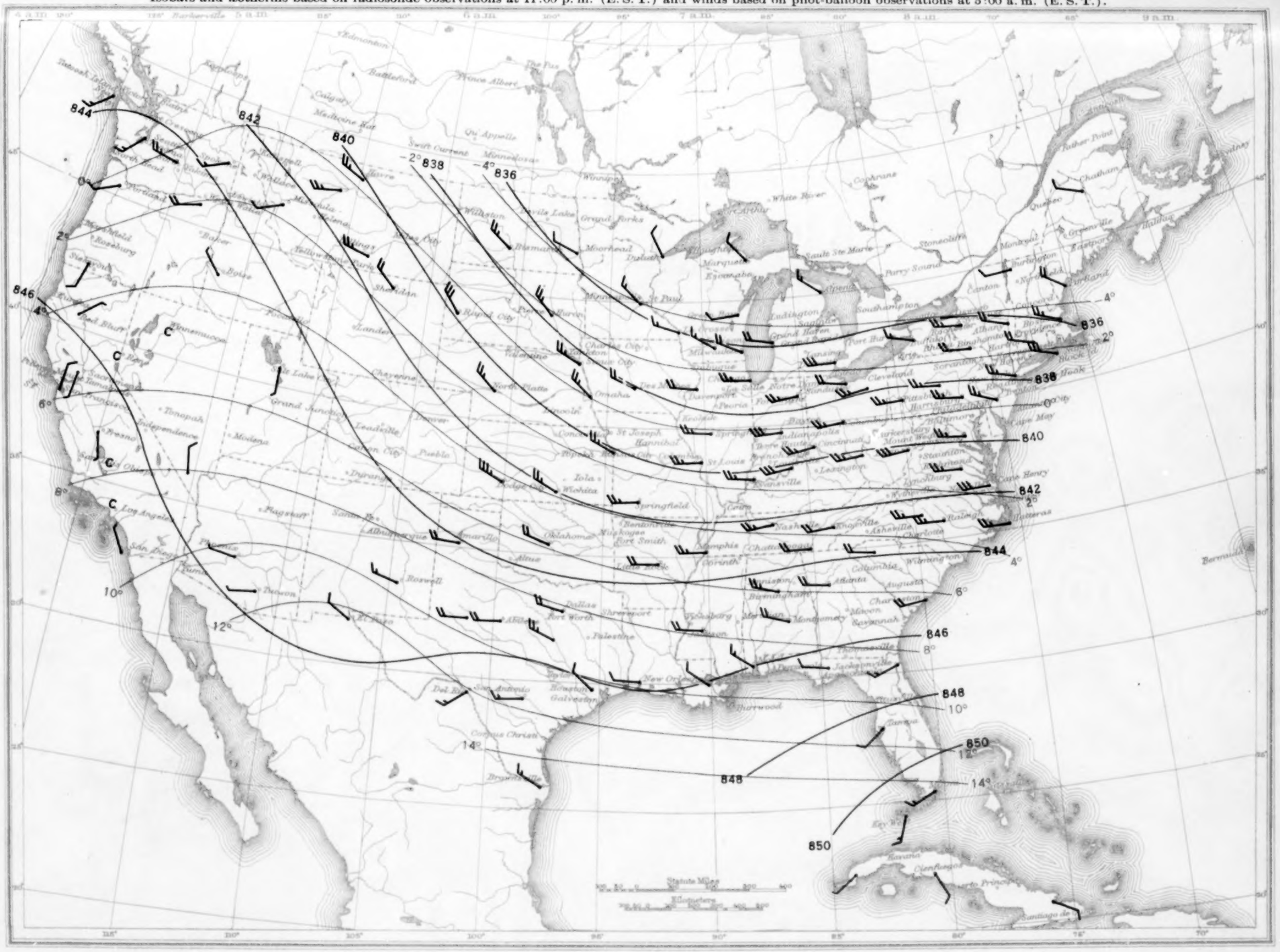


Chart IX. Isobars (mb) Isotherms (°C.) 11:00 p.m. (E.S.T) and Resultant Winds 5:00 a.m. (E.S.T.) for 3,000 Meters (m.s.l.) March 1942

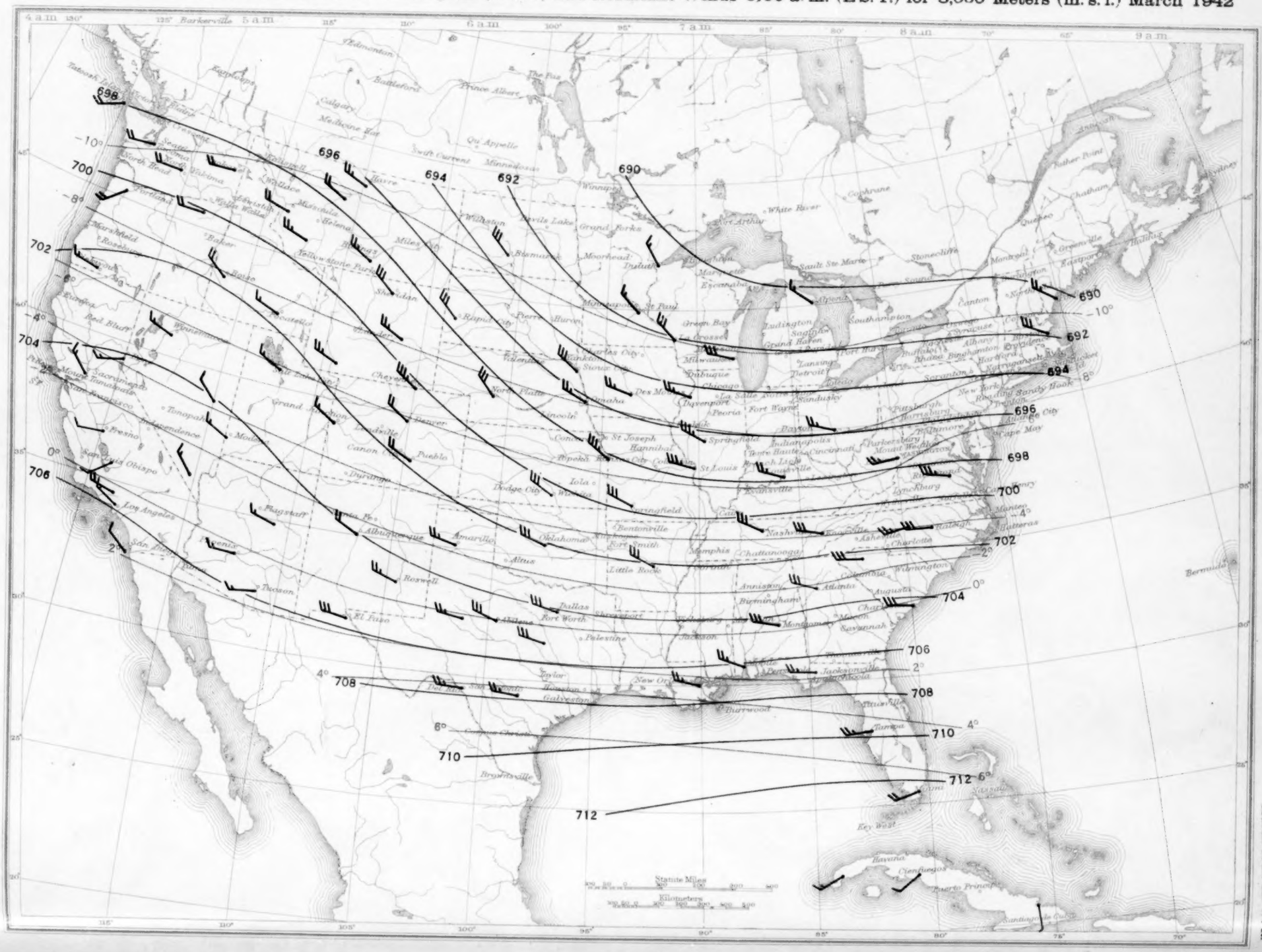


Chart X. Isobars (mb) Isotherms (°C.) 11:00 p.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 5,000 Meters (m.s.l.) March 1942

Chart X. Isobars (mb) Isotherms (°C.) 11:00 p.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 5,000 Meters (m.s.l.) March 1942

Chart XI. Isobars (mb) Isotherms (°C.) 11:00 p.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 10,000 Meters (m.s.l.) March 1942